75c (8/3)

NOVEMBER 1970

AMERICAN aircraft modeler

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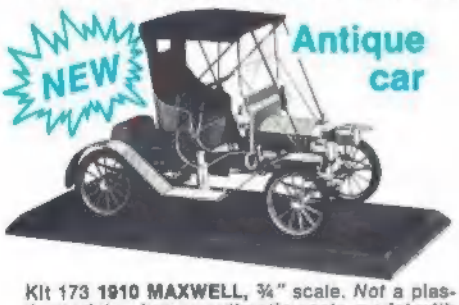

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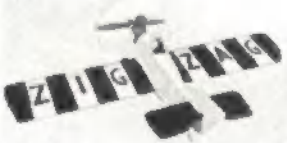

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AMERICAN aircraft modeler

COVER PHOTO: Miss Terri Green poses with Terry Aldrich's Waterman Aerobile at Santa Maria Airport. On real plane, entire swept flying wing could be removed when fuselage was driven as a car. Photo by Aldrich.

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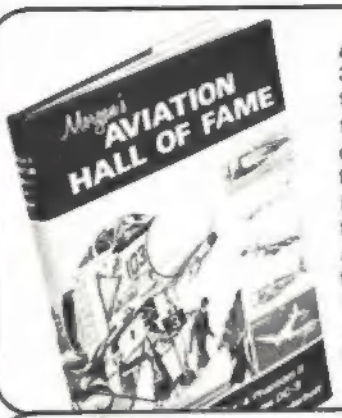

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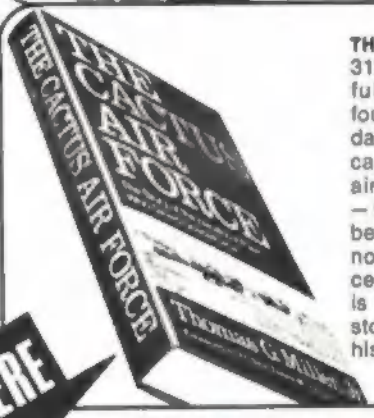

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Straight...and Level

There will be a 1971 Spokane Internats—and that's a story in itself

BOB KING, alias Robert F. King, Brigadier General Washington Air National Guard, Assistant Adjutant General, Air, is quite a guy. His letter of July 17, to "all concerned" with the Spokane Internats, that this two-year-old meet would be held again on July 10-11, 1971, proves it.

"On the basis of U.S. Weather Bureau climatological records, these dates should assure optimum conditions for a model airplane competition," he wrote us all. "Consideration is being given to making next year's Internats a three-day program instead of two. Many persons have suggested this."

Knowing King, S&L can't repress a benevolent chuckle. The events that occurred during the 1970 affair last June were wild. This is an ambitious undertaking, requiring the kind of coordinated logistics which only the Navy has approached (Navy's chores with the bigger, longer, heavily attended Nats are much tougher —though Navy can swing the manpower) and Plymouth flawlessly exhibited in the past at their own Internats in Detroit, which followed a nationwide elimination tied in with their dealers. The Washington ANG had this thing organized like clockwork.

The meet began on Saturday. Out at the field, where Voodoos—the real ones!—took off in pairs for their electronic war-games practice, there was a neatly organized trade show, in a spotless hangar. Bleachers lined the taxi strip. Governor Evans, whose boys are modelers, was due to address the crowd. Pylon jobs zipped back and forth in front of the stands—but the action was strangely subdued.

Way out on the field, the Pattern event crates performed occasional, lonely antics. In those vast open areas even a busy meet gets swallowed up. And it was overcast, chilly, and somewhat windy. We weaker souls took refuge in guest trailers, drowned ourselves in coffee, and talked shop. For New York this would have been a raw April day.

That night a banquet was scheduled at the Ridpath Motel for the Hall of Famers—Korda and Lewis couldn't get there, which made the writer a still colder specimen, what with a talk and gosh knows what else coming up. The banquet, incidentally, was a smash hit and, whereas the flying field looked half empty, the hall seemed crowded with all the modelers in the world. There was action in Spokane, that's for sure.

So on Saturday afternoon the governor, who was to fly in after a commencement address at a major University, was running late. The stands, of course, were empty. Would the meeting take place in the hangar? No. Where then? So a press conference was set up and, wouldn't you know it, the packed conference room, TV, radio and all, was taken over by hard-hitting reporters who bugged the patient governor about conservation, parks, and campus disturbances. It took nervy Jerry Kleinberg to give the governor a chance to talk about modeling and his boys.

On Sunday, as we jetted out to feed our own Monday morn press, a driving rain was sweeping all before it. Misery! Someone asked the modelers if they couldn't speed up results—not knowing what was involved in finishing some events. You know modelers? Many of them vowed never again to leave sunny California. There followed a dejected notice by mail that in view of their excruciating pain (our words), there would be no Spokane Internats in the future. Bob didn't know his modelers. Take away a contest? Never!

So here's Bob delightedly telling us that: "It would seem that in its short life, the Spokane Internats has acquired a faithful and vocal 'alumni association' of sizeable proportions." And that: "Such loyal support is deserving of reciprocity of the Washington ANG." For the writer there's quite a story behind this.

It was on a nasty Saturday morning, three years ago, that we had written an editorial on the Navy's threat to drop the Nats because of lack of genuine youth participation. While AMA took care of that with a wow of a Delta Dart program held on the NAS involved, and all is now peace and light, Bob King happened into a library, noted a copy of AAM, and opened to that editorial. Knowing nothing about modeling he saw only the need to do something for air-youth. Letters, phone calls, and visits followed. He got after AMA, all the magazines.

The Camp Murray program was started, with kids to visit, receive instruction, fly models. A $1,000,000-plus program was designed and pursued with school authorities and government in the far Northwest. Tremendous interest was generated—there would be facilities, tools, the works. A beautiful building, and King's personal magnetism and incredible dedication made the dream seem a shoo-in. Well he got part, not all, of what he wanted—but don't count him out. On top of all this, he dreamed up the Spokane Internats, to draw crucial attention to the real significance and size of the modeling movement, and all its social values to youth. It would be nice if you guys join this fight and, if possible, get to Spokane next July. It's part of a bigger thing. It should not be provincialized. Why not National Air Guard support for a program which includes kids—little ones and "big ones" both. More support is our constant bellyache.

Why this editorial? Well, it's about something a thousand times more important than that stupid inter-magazine spat over who really sponsored with what motel, you-know-which contest in the southwest. King is a man with a mission—one in a million. He produces. He keeps promises. Now Bob knows we favor his getting behind the kids, working with them in the Camp Murray concept, promoting Delta Dart things in the inner city—and we'd like that to catch fire nationally.

"Knowing how you feel about such things (as Bob knows, we don't flip over any man-only contest, not after all these years), I don't suppose the attached pronouncement will excite you," he writes, referring to the 1971 Spokane Internats. "You promised comments on this subject. Please don't forget."

Bob promised us something too at that Spokane banquet. That was never to give up his crusade. That's a hell of a lot to ask of any man. He won't. Go to Spokane. Get behind any youth-promotional thing in your own city, school, shopping center, hobby shop, or your own club, whether or not Spokane is out of the budget. Let's keep faith with this man.

William Winter

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Barry Goldwater—modeler

Men from all walks of life have in the past and are still building Cleveland-designed models. You can imagine the thrill when I received a letter from an old modeler, Barry Goldwater, United States Senator from Arizona. Needless to say, I feel very honored to have him as a C-D fan for many years, even though unknown to me until the receipt of the following letter:

"First of all, I doubt that there are many people in this country who have made more kitted models than I have. I have flown over one hundred different types and am constantly finding old ones that have been out of manufacture for years.

"I am looking forward to the Great Lakes Trainer coming out again. In fact, I would like to have one sitting out at the field right now, as it has been a long time since I have felt wind on my face; that little airplane was the best.

"I am glad you have started the foundation. Things like that are long overdue in this field. In fact, I am trying my best to get the Smithsonian to start the Astronautical and Aeronautical museum going."

Ed Packard, Cleveland, Ohio

Beyond the Delta Dart

Three cheers for the editorial in the July issue. You have clearly and succinctly presented what I believe to be our hobby's most serious problem today. As an old timer and an unabashed free flight enthusiast, I fear that we will lose a wonderful hobby if large numbers of today's young people are not given an opportunity to progress through easy steps of free flight flying.

The Delta Dart program is a wonderful start—but, as you so aptly questioned, where do they go from there?

Although there must be steps in between, I have taken some heart at the spreading interest in the so-called ¼A size powered models using the .020 engine. The relatively low cost, the more modest building space needed, the easier portability and the much smaller field requirement all seem to point to this size powered model as the direction to go to make such flying available to a larger segment of our younger population.

As with the Delta Dart, available kits and sponsored events will be needed in order for this to catch on. I am convinced that this size gas model should receive the full support of all those interested in saving free flight flying.

Stanley Johnson, Whittier, Calif.

Ultimate status symbol

I got a real kick out of Hannan and Barrera's "Field Kit for a Free Flighter." Free flighters are not the only ones who suffer feelings of inferiority and rejection at the field, though. Among RC'ers a similar status gap exists between those who thumb dual-axis levers on fancy boxes and those of us who (because of eccentricity or impoverishment, or both) still push a simple button on a simple-looking box.

Now that some propo manufacturers have a battery-test button on the faces of their transmitters, we single-channel nuts can indulge in a little status-enhancing deception of our own. The procedure is as follows: Put the guts of your simple tone transmitter in a larger, appropriately shaped, vinyl-covered box, with the on-off switch in the middle and the tone-keying button in the upper right corner.

Then mount an RF meter, two control sticks, and a row of auxiliary channel levers in the customary locations. Naturally, everything on the face of the transmitter except the switch and the button is non-functional, except perhaps to your psyche.

Since purchasing two control sticks would put quite a hole in the budget, these can be simulated by simple aluminum rods that protrude through large square holes cut in the face of the transmitter. This carries the deception a step further by pegging you as a perfectionist who demands nothing less than the best in precision—provided by open-gimbal sticks!

Phil Milam, Atlanta, Ga.

Infamous Q, pollution culprit?

Reading "You Said It" on the GHQ engine and not bragging about the age limit on model builders, I have a tale of the GHQ. . .

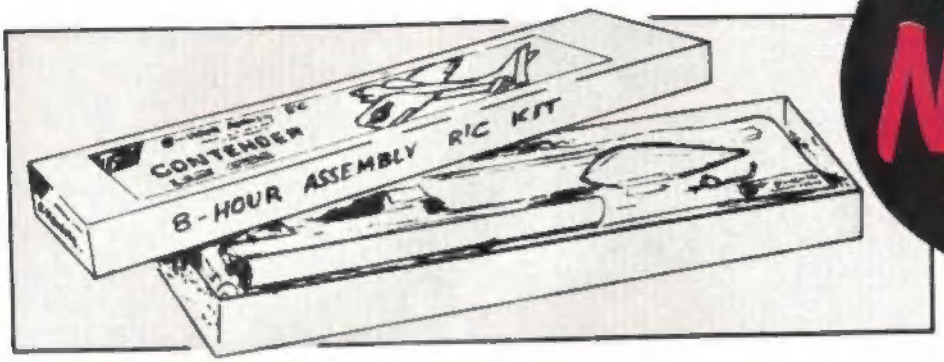
In 1932, for some reason or other, I won the Manitoba Provincial Model Airplane contest and a trip to Toronto. Some fellows were there from Akron, Ohio that year to show us the gas jobs. They flew all right, glide angles about 1 to 5, but that gas engine—Brown Jrs. Oh, boy! They were hard to get but after a year a buddy and I saved the $21.50. With the duty it came to $39.37—I still remember trying to get it out of the Post Office.

In January of 1935 it was ready to go. My father was (and is) a great man—"Finish the plane and then start the engine." He just didn't know general headquarters.

Out to Stevenson's Aerodrome at 32 degrees below. I remember trying to start that old buzzard in the Old Winnipeg Flying Club hangar, with plenty of expert help. It didn't run.

We took the engine out—set it up

FROM THIS



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in the vise, cast an aluminum prop and worked hard. One night I tried it again and actually got a pop out of it. It fell from the vise and took off all by itself, hitting all four walls of the basement and conked out. The sorry part is that after all the cranking all of us did on the Q, the only flight it ever made was by itself. It never ran again.

By March, I owned a new Brown Jr. and flew my Maylplane LR1 when it was only 10 below . . . successfully.

Oh yes. The GHQ was dropped from the Redwood Avenue Bridge into the Red River of the North. Possibly started all the water pollution that we hear about nowadays.

A. J. May, Bismarck, N. D.

Perhaps we all have a common ancestry. Who didn't have a GHQ?
—the Publisher

Cover girl?

I feel compelled to reply to "modeler's wife," whose letter appeared in the July issue concerning the "cover girl" and "half-clad woman" as featured on the March 1970 cover.

The "cover girl" mentioned must be all of 12 or 13 years of age *(Ed. note: She is 16)* and I'm sure any parent would be pleased to have as their daughter such a wholesome all-American appearing girl.

"Half-clad"?? Modeler's wife hasn't been to the beach lately or stopped by her local junior high school to witness ladies attire.

As for encouraging our children to go into a hobby, how many model enthusiasts do you know who are drug addicts and criminals? Modelers are too busily involved with the hobby to become troublemakers. And what about disabled persons, people from broken homes and those with personal problems for whom modeling has provided a new direction in life, a wholesome interest to pursue.

Ed Okie, Cypress Gardens, Fla.

Defender of free(dom) flight

I just finished reading "Field Kit for the Free Flighter" (Aug. AAM): Hannan and Barrera had no right to knock FF for it is an art. We free flighters are the cream of the crop in this hobby! We are the ones that have to trim our planes each flight until they fly right—or else they won't fly at all.

The article mentioned that a free flighter goes to the field with a feeling of inferiority and rejection. Somebody's nuts! FF has a higher standing in my book than RC and CL—and we need no status at all.

We don't fly RTF or ARTF. We have to *build* and fly, not take a plane out of a box and fly it, which makes FF all the more special.

Michael Valdrow, Milwaukie, Oregon

We doubt that either Bill or Russ look down their noses at free flight, both being generally interested modelers—and Bill builds practically nothing but FF anyway, even if it is the zany or fun-type stuff. Tongue-in-cheek stuff can backfire when it concerns the other guy's bit. Do agree, Mike, that FF needs no defense. It's proud stuff.
—the Publisher

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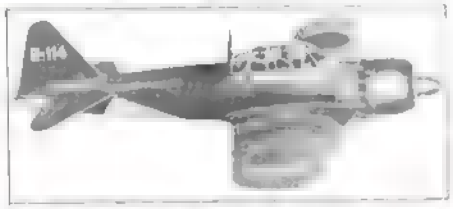

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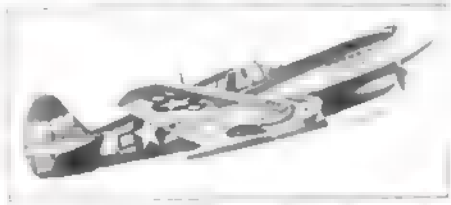
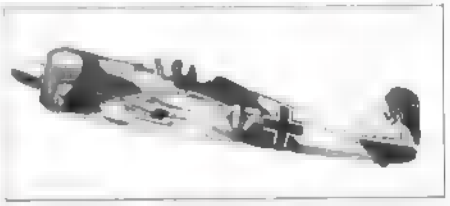


KIT [redacted] CURTISS P-40 WARHAWK • 28" $6.00
"Flying Tiger" of China-Burma — WW2.

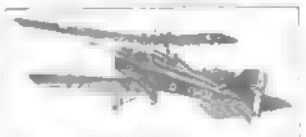


KIT 406 FOCKE-WULF FW-190 • 25¾" $6.00
German radial engine fighter.

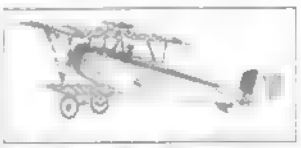
World War 1

scale flying models

KIT 204 [redacted] TRIPLANE • 20" $4.00
Made famous by Germany's [redacted] Baron, WW1.



KIT 202 BRITISH SESA • 24" $4.00
Fighter flown [redacted] Bishop and Mannock.



KIT 203 NIEUPORT 11 • 24" $4.00
French "Lafayette Escadrille" combat plane.

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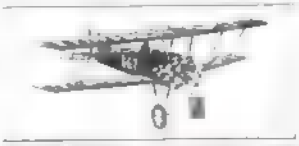
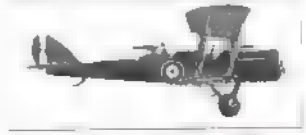
Dramatic model creations of the planes flown by the air heroes of the first Great War. Superb kits for the scale builder or flying enthusiast. Designed to be flown either rubber powered or free flight with the Cox .020 engine.



KIT 201 THOM. [redacted] SCOUT • 24" $4.00
American trainer.
Over 550 built.



[redacted] 205 DeHAVILLAND 5 • 27" $4.00
British "Flying Coffin" day bomber.

KIT 206 RUMPLER C-5 • 24" $4.00
G[redacted]
artillery-observation plane.

PAUL K. GUILLOW, INC.
Dept. [redacted], [redacted], Mass. 01880

[redacted] and all Guil[redacted] kits — [redacted], send direct to factory [redacted] packing and post[redacted] U.S.A. $1.50 outside U.S.A. Send 10¢ for listing of [redacted] kits

On the Scene

Wright Brothers Memorial RC Championships

An interesting visit to one of the biggest annual RC meets.

DON LOWE

Photos by Chuck Shade

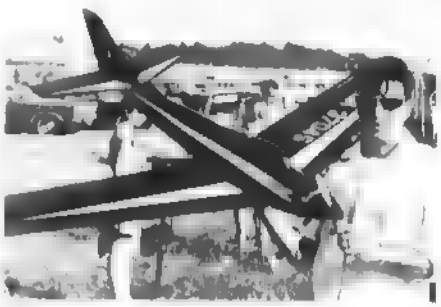
THE EIGHTH ANNUAL WRIGHT Brothers Memorial RC Championships were held in excellent Air Force facilities, but the weather ranged from perfection on Saturday to high winds and spotty showers on Sunday. Sponsored by the Western Ohio Radio Kontrol Society, this meet drew many contestants from around the country. Its ten scheduled events included Class A Jr./Sr.; Class A Open; Class B; Class D N & E; Scale: Formula I; FAI Pylon; and a special event, Biplane Pattern.

Competition in the pattern events was pretty evenly divided. Pattern was flown using six-minute short patterns on Saturday, with four flights per contestant. Four flight lines were set up, using the NATS arrangement of two lines on each of two complexes. At each complex, a numerical display system, visible from all over the area, indicated the next flier up and kept fliers constantly informed of their flight positions. This assured

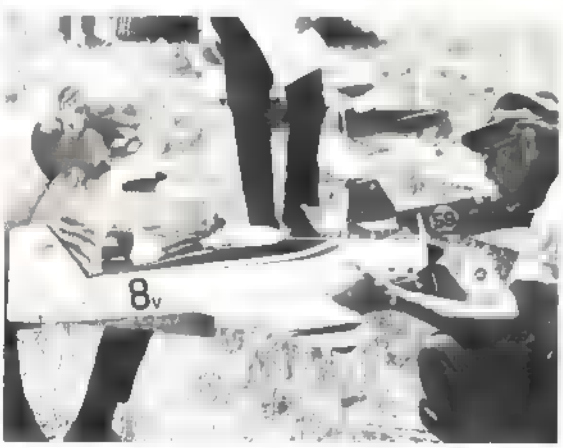
(Continued on page 68)

Thirteen scale models were entered. Note variety in age and type categories.

Jerry Worth shows off his low mid-wing "Rampage." A very pretty original design.



A Phoenix flown by Al Dupler to 4th in D Expert. Mufflers used by almost everyone.

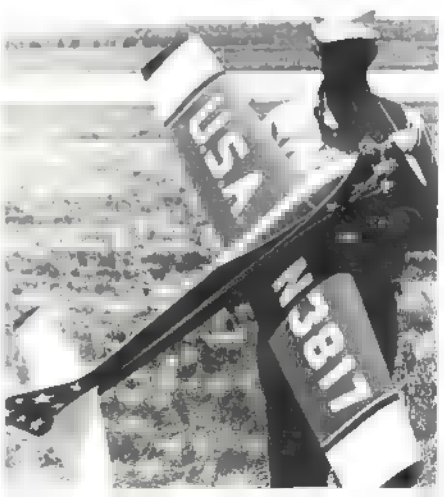


Above left: [illegible] Izzo emphasizes a point! He had tough luck with collapsing retracts and with rain during flyoff.

Above right: Ken Drummond's B-36 uses 35's, weighs 19 lb., operates flaps, drops bomb in flight, and flies extremely well.

Left: Don Lowe and son inspect Formula I racer. Racing is now such a popular event that separate meets are needed.

Right: [illegible] Keck, winner in Class D, flies KDH-retract-geared original "Starfire." A groovy and graceful plane with colorful and purposeful paint job. Strip ailerons are becoming popular again.



CARL GOLDBERG

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The Versatile *Almost-Ready-To-Fly* Fun Model

For Single or Multi-Channel Radio Control; Also Free-Flight

Span 42"
Length 31"
Area [redacted] sq. in.
Weight 26-36 oz.

For .049 to .10 Engines

Only $17.95 PRC1

Can be flown [redacted] ways:

1. Single Channel Radio, Rudder Only
2. Single Channel Radio, Galloping Ghost
3. Two Channels, Rudder and Elevator
4. Three Channels; Rudder, Elevator, Engine Throttle
5. Four Channels; Rudder, Elevator, Engine Throttle, and Ailerons
6. Free Flight

Full explanation of each method given [redacted] plan.

FEATURES:

- One-piece molded Wing, high-lift
- One-piece molded Stabilizer
- One-piece molded Vertical Fin
- Molded Fuselage, completely assembled with firewall, nose gear, plywood floor, side rails, and main landing gear block already installed
- Complete fittings — nylon links, horns and keepers; nylon hinge material, screws, blind nuts, washers, eyelets, retaining springs, etc.
- Complete plans, with step-by-step illustrations
- Instructions on Operating Radio Control Models

Radio Control Flying [redacted] Fun! You can actually feel the thrill of controlling [redacted] airplane in flight — doing stunts, loops and rolls — and making it come back [redacted] you and land where you want. And the shortest way to success is with the unique new RANGER 42. This model has been carefully engineered, leaving only the simplest final assembly steps, all clearly illustrated. Flight stability is exceptional, [redacted] well as response to control. **All you have to [redacted] is add your engine, wheels, and radio control — only 6 to 8 hours work — and you're ready to [redacted] FLYING!** Just ask your hobby dealer — he'll be glad to show you the features.

SKYLANE 62

Semi-Scale Beauty [redacted] Great Flying Model!

DELUXE — Includes New Fittings

$34.95

Tough, [redacted] and front end, takes single to 10 channels or proportional. Steerable nose gear.

SPAN 62" AREA 540 [redacted] in.
LENGTH 50" WEIGHT 4½-5 [redacted].

FOR ENGINES FROM .19 to .35

½A SKYLANE $9.95

For Single Channel — Escapement, Servo [redacted] Pulse
Span 42" Area 244 sq. in.
Length 35" Weight 22 oz.
For .049 Engines

The Design That Makes The Simplest, Sound, Attractive Airplane

THE FAMOUS **FALCON**

Sr. Falcon Shown

SR. FALCON $34.95

DELUXE — Includes [redacted] Fittings.
For 10 Channels [redacted] Proportional
Span 69" Area 810 [redacted]
Length 53" Weight [redacted] Lbs.
For .35 to .[redacted] Engines

FALCON 56 $18.95

DELUXE — Includes [redacted] Fittings.
Takes Single to 10 Channels [redacted] Proportional
Rudder-Only or Multi-Training
Span 56" Area 558 sq. in.
Length 43" Weight 3½ lbs.
For .09-.15-.19 Engines

Junior FALCON $6.95

DELUXE — Includes New Fittings.
For Single Channel — Escapement, Servo [redacted] Pulse
Span 37" Area 250 sq. in.
Length 28" Weight 16 oz.
For .049 Engines

World's FIRST Single or Twin Engine R/C Models

SKYLARK

Skylark 56 Shown

DELUXE — Includes New Fittings

SKYLARK 56 $21.50

Takes Single to 10 Channels or Proportional
Span 56" Area 528 sq. in.
Length 44" Weight 3½ - 4½ lbs.
For Single Eng. .09, .15, [redacted] .19
For Twin Eng. Use Two .09's [redacted] .15's

JR. SKYLARK $7.95

For Single Channel — Escapement, Servo or Pulse
Span 37" Area 235 sq. [redacted]
Length 29" Weight 18 oz.
For Single Engine Use .049
For Twin Eng. Use Two .01's or .02's

The Goodyear Racer with Enough Wing Area and Stability so YOU Can Fly It!

Shoestring

$27.50

DELUXE — Includes New Fittings

[redacted] S. S. [redacted] [redacted] PROPRIETARY

SPAN 54" AREA 540 Sq. In.
LENGTH 44" WEIGHT 4½ - 5 Lbs.

FOR .19-.40 [redacted]

Most Beautiful R/C Ever Kitted!

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I am sending 10c for 4 pg. Illustrated Catalog with "Recommendations on Starting in R/C." Basic Explanation of R/C Equipment, and Radio Control Definitions.

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Tips for Performance

Exploring rubber-power flying models the direct way, using ■ 49¢ ready-to-fly balsa job.

BILL HANNAN

ALTHOUGH RUBBER IS one of the oldest forms of model aircraft power, it remains one of the least understood. By employing a simple "flying laboratory" approach, much of the mystery can ■ eliminated. If deep theory and equations are your bag, look elsewhere! Here we shall try to prove that learning can ■ fun.

The first requirement is a simple, dependable aircraft. Several brands of ready-to-fly models are on the market, but a North Pacific Sleek Streek was chosen because it is widely available in

Any model's performance can be improved systematically. Tests and experience are best gained with ready-to-fly types.

hobby shops, supermarkets, and some drug stores. If this brand cannot be found, another may be used. Other slightly more complex aircraft, such as Delta Darts, ■ suitable also.

The Sleek Streek is assembled according to package directions, with the following exceptions: (1) Two pieces of masking or clear tape are applied across the wing center section. This prevents the wing panels from popping out of the wing mount in ■ of a hard landing; (2) After being correctly aligned, the fin and stabilizer are glued into their slots. These changes are not intended to hop up the model, but are merely to make it more rugged and able to withstand the rigors of hard testing.

Equipment and Materials

In addition to the model itself, the following items will prove useful: stopwatch, mechanical winder, needle-nose pliers, wire cutters, 1/32" diameter music wire and sandpaper. Also needed are tape, glue, different sizes and types of rubber, different sizes and types of props, rubber lube, oil and thrust washers. It is not absolutely necessary to have all of the above items, but the more that are available, the more extensive can be the experiments. Briefly, the purpose of each item is as follows:

Stopwatch: To determine how changes affect ■ model's performance, a means of comparison is needed. Judging slight improvements by eye is difficult and ■ best inaccurate. Measuring the actual time in the air from launch until touchdown is a much better system. If a stopwatch is not available, a regular watch with ■ sweep second hand will do.

Winder: This is a basic tool for rubber-powered model flying, since winding by hand ■ ■ slow, tiresome task. Some modelers prefer to wind by hand and can offer good reasons for doing so, but they are in the minority. Winders can be purchased commercially, or they may be converted from hand drills, by attaching a suitable winding hook. If you construct your own, make certain that the hook is securely attached, so that it will not work loose under ■ strong pull. Winders differ in ratio; that is, for each turn of the hand crank, the hook will revolve ■ given number of times. The hand drill conversions usually have about a 4 to ■ ratio, while the small commerciallly-made units have ■ 16 to 1 ratio.

Needle-Nose Pliers, Wire Cutters: These tools are used to fashion propeller hooks, for ■ when propellers ■ changed.

Music Wire: One length will provide enough material for many prop hooks.

Sandpaper: Use to reduce the weight of the heavy blade, if ■ prop is found to be out of balance. It also may be used to smooth and lighten the entire model, if desired.

Tape: Use to reinforce the wings and for emergency repairs.

Glue: Use for assembly and repair purposes.

Rubber: Several sizes and types of rubber strand are manufactured. Try at least a small quantity of every available size. If the local hobby store does not stock different types, try a mail-order source. For longest lift, rubber should be stored in an air- and light-tight container.

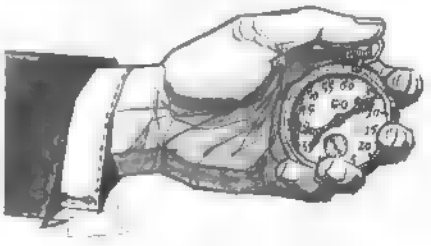
Propellers: The ready-to-fly model comes equipped with ■ prop, but, in addition, obtain one or more different types. For example, the North Pacific Skeeter, ■ smaller model than the Sleek Streek, features a scaled-down version of the same prop design, and the plastic nose piece can be directly interchanged with the larger one. Other brands of plastic ■ wooden props in the four- to six-in. diameter range should be obtained, if possible, for test purposes. Some props left over from small kits also would be suitable. The more types on hand, the more prop/rubber combinations can be tried.

Rubber Lube: A real must for rubber-powered models, rubber lube will allow any given motor to accept more turns and will extend its life. Commercially-prepared lubes are available at low cost, or castor oil may be used. Do not use common motor oils, which will attack rubber.

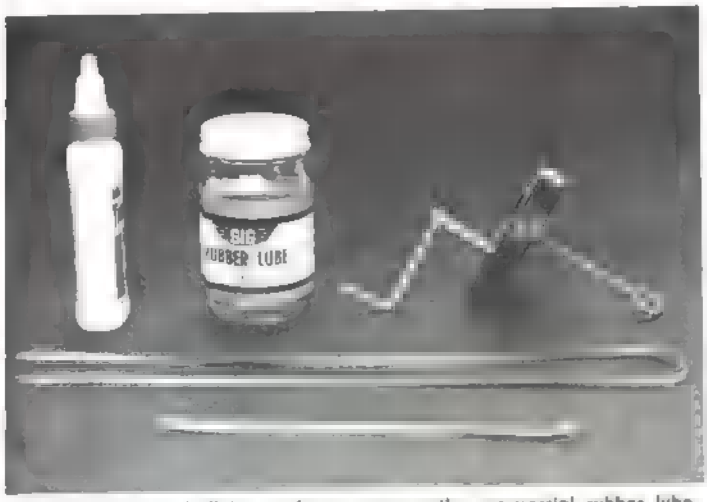
Oil: While motor oil cannot be used to lube rubber, do use it or sewing machine oil on the prop shaft bearing. A single drop is enough, since an excessive amount is apt to work its way down the shaft and onto the rubber.

Thrust Bearings: Some ready-to-fly models do not feature thrust bearings. After a time, the plastic prop hubs wear down and friction increases. To prevent this (or remedy it) tiny washers or sequins are placed between the prop and prop shaft bearing. Some experts instead use Teflon washers, which do not require lubrication.

Notebook and Pencil or Pen: Any



Most important testing tool is the stopwatch. Checking relative performance ■ the goal.



Glue to attach flying surfaces permanently, commercial rubber lube, a commercial winder (or alter a hand drill), and a selection of rubber of different sizes are needed.

Changing props will significantly affect ■ model's ■erformance. Smaller prop and motor might fly the plane longer than ■ big prop and strong motor. Some effects are surprising!

small notebook or tablet will ■■■ to record test results for future reference. The simple form we used is illustrated, but you may wish to design your own.

Last, but not least, find a willing ■ssistant to help with the experiments. If it can be another modeler, both will benefit greatly and perhaps they ■■■ share the supplies.

Testing Procedure

All tests should be performed under calm conditions, since wind can adversely affect flight performance and cause inconsistent results. Early mornings and late afternoons generally ■■■ the quietest times.

First flights should be performed according to the manufacturer's instructions, hand wound, and with the standard prop and rudder. Primarily, this is to be certain that the balance is correct. If necessary, shift the wing along the fuselage or, in the case of ■ model which does not have a movable wing, add clay ballast at either the nose or tail, as required. Check also for warps. Sometimes during shipment a panel will become twisted or bent. By breathing heavily on the affected part and bending it a little beyond the desired position, a warp can usually be corrected. Be aware, however, that it may return, especially if the temperature changes.

Once satisfied that the model is flying reasonably well, try timing a few flights. Our initial timed flights were performed using the manufacturer's recommended 170 turns, hand wound. Bear in mind that individual models will vary in performance ability, depending upon the weight of the balsa from which it was made, length of time the model has been on the dealer's shelf (which can affect rubber condition), etc. Caution: beware of false readings. A poor launch can handicap the model's true potential and, conversely, ■ thermal can boost duration. Neither presents a true picture of what the model is likely to do under average conditions. The number of flights per test is a matter of choice, but at least three ■■ four are suggested.

If the model is equipped with ■ propeller free-wheeling device, as are Sleek Streeks and Delta Darts, conduct an instructive test by timing the model with the free-wheeler locked up, by means of tape or string. Note the effect ■■ the glide.

Next apply some rubber lube to the stock rubber band, and note how it alters the feel even while hand winding.

Winding

When using a mechanical winder, models are usually wound from the front. However, with simple stick models, we prefer to wind from the rear, since it is easier to remove and attach the rubber loop to the rear fuselage hook. The procedure is as follows: have a helper grasp the prop firmly, while you stretch the rubber loop to about three or four times its normal length with the winder. While cranking in the turns, walk slowly toward the model until a point near the rear hook location is reached. The safe number of turns will have to be learned by experience, and ■ few strands of rubber will be broken while a feel for it is developed. Charts which list the safe number of turns that can be used for different sizes of rubber have been published. The mathematically inclined may study one or more of the charts, but none is a substitute for experience. Rubber is inexpensive when compared to glow fuel or rocket motors, so don't be afraid to sacrifice a few strands in the interest of education!

It should be understood that individual batches of rubber differ in quality, regardless of brand, and results can be expected to vary. The big advantage of testing rubber on simple models is that a blown motor is unlikely to do much damage. By contrast, a fractured band in ■ scale job is almost bound to extract a few bits of structure and tissue in the process!

Another important point to remember: count the number of turns as they are put in, so that results can be duplicated. Usually only the turns of the winder's crank are counted, ■■ don't bother computing how many actual turns are being put in. It is merely ■ matter of multiplication to find the actual number of turns for scientific comparison. Warning: a prime rule in rubber power model circles is never talk to a man while he is winding!

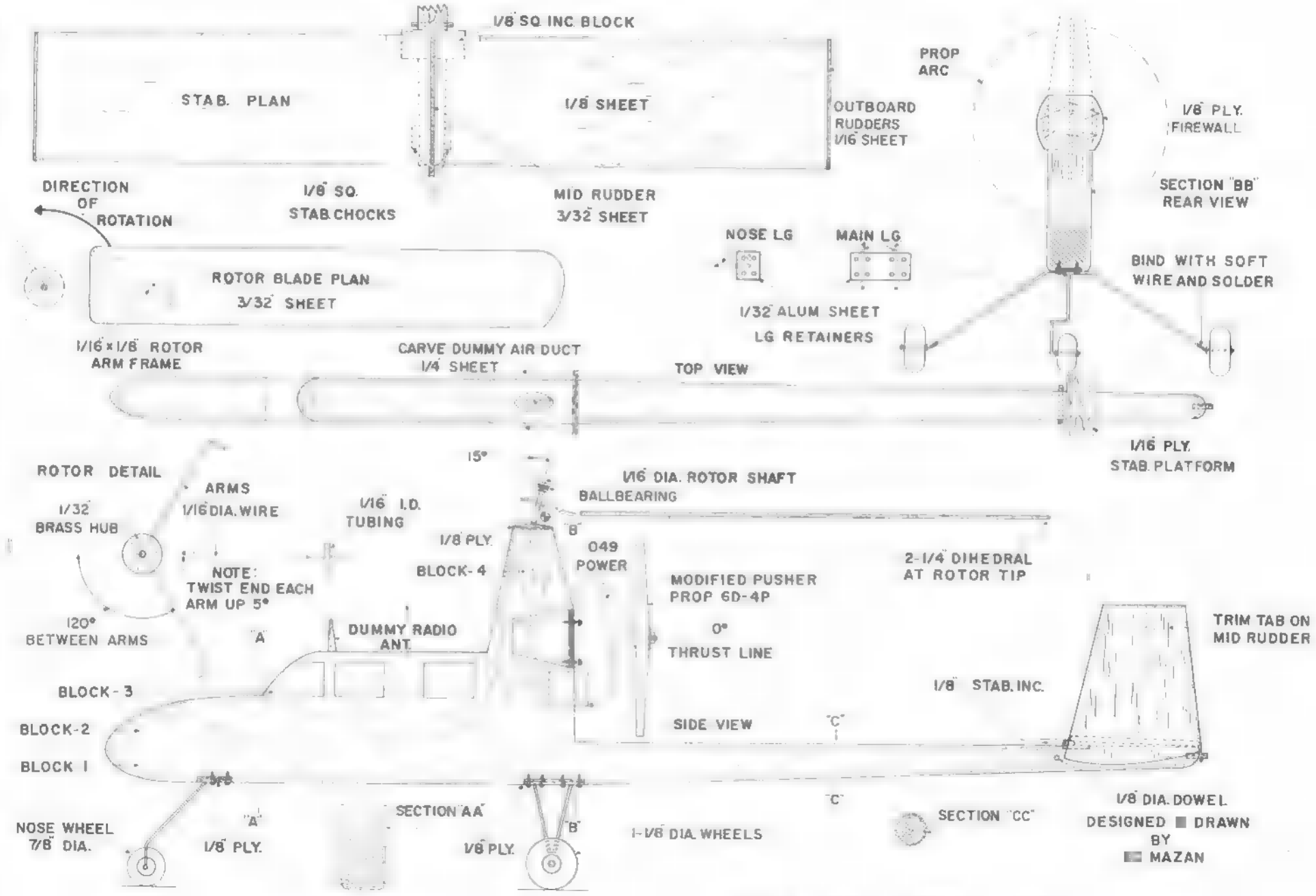
Any reference to breaking in rubber motors has been purposely omitted. It is another subject of conjecture and controversy. Suffice it to say that the properties of ■ motor change somewhat after it has been wound several times. This too becomes evident as you go along. After a stock motor or two has been used up, make new ones from rubber strand. With any given size of rubber, the power can be varied by altering the length of the loop. A short loop produces greater power, but it cannot hold as many turns as a longer loop. The knot should be securely tied before applying rubber lube, since it is difficult to tie ■ knot in slippery rubber.

Note that when changing rubber or loop sizes, the balance of the model may be affected, and suitable adjustments will be required. Also, greater amounts of power will usually alter much more than just the models' duration. A model, which is docile with low power, may turn into an unmanageable beast when more "zap" is applied. Thus ample practice in adjusting the model's flight sur-

DATE: OCT. 4, 1969	CONDITIONS: CALM	FLIGHT NUMBER			
MODEL: NORTH PACIFIC "SLEEK STREEK"		1	2	3	4
COMMENTS: STOCK PROP, STOCK RUBBER		(TIME ■ SECONDS)			
HAND WOUND, 170 TURNS		8.5	7.0	9.0	9.5
STOCK RUBBER, 240 TURNS, WINDER WOUND		12	11.5	N.G. (CRASH)	12.5
" " 320 TURNS " "		15	14.5	15.2	15.5
" " MOTOR FAILED AT 336 TURNS					
TESTS CONCLUDED BECAUSE OF DARKNESS.					

TYPICAL PERFORMANCE CHART

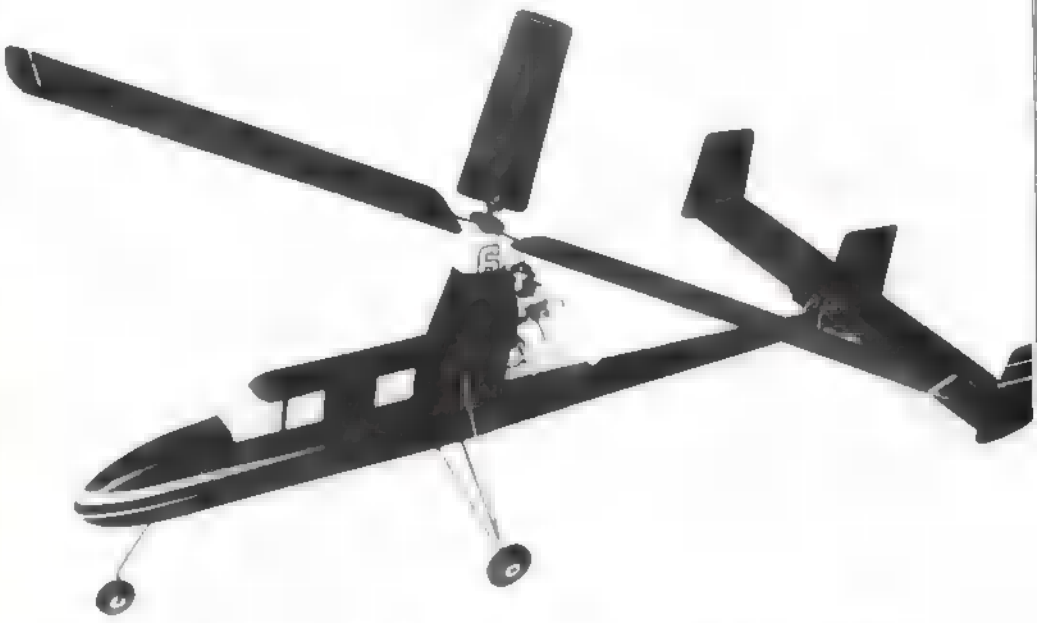
(Continued on page 74)



FULL SIZE PLANS AVAILABLE—SEE PAGE 70

FULL SIZE PLANS AVAILABLE—SEE PAGE 70

As author illustrates, one must hold the model into the wind to get rotor up to speed. It does not take off from the ground.



This spin-wing plane is patterned after the Umbaugh autogiro. Note the use of three rudders for adequate stability and to balance the cabin area. As long as the rotor is spinning the plane is safe, low altitude stalls and engine failures are not disastrous.

AUTOGIRO

This wing slinger is a humdinger. Climb is fantastic and glide is all non-thermaling.

ED MAZAN

THE AUTOGIRO WAS invented by Juan de la Cierva of Spain. Although Cierva designed numerous successful conventional aircraft, he constantly searched for means to make air travel safer. In the early days of aviation, pilot error was the most common killer, since fixed wing aircraft often stalled and crashed. Cierva finally envisioned an aircraft with a freely rotating wing which could be completely independent of speed. In 1923 the autogiro was born.

Using a conventional aircraft, Cierva replaced the fixed wings with a free-spinning rotor, mounted off the fuselage on a tripod pylon. The autogiro proved its safety characteristics. No stalls or spins marred its performance. Most important was its ability, upon engine failure, to descend almost vertically at a rate roughly comparable to that of a parachutist.

The autogiro is not a helicopter. Their only likeness is the rotor, and their flight characteristics differ greatly. Autogiro lift is accomplished by a free-floating rotating rotor not connected to engine, while forward thrust is derived from a conventional motor and propeller.

Our model autogiro is a semi-scale design based on the recent full-scale Umbaugh autogiro. The ship is made of light or medium-weight solid balsa. It requires a large fuel tank because, in still evening air, the autogiro is capable of reaching fantastic altitudes nearly overhead, yet descending only yards from the point of launching.

Construction

Fuselage: The fuselage is carved from a unit of four separate solid balsa blocks, glued together. From 1" sq. light weight balsa, cut to proper length Blocks 1, 2, and 3, as indicated on plans. Arrange the blocks in proper order, glue and allow a reasonable time for drying. Cut Block 4 to length from medium weight balsa, 1x2" in cross section. Using the X method, find the center of each block's end. Through these bottom ends, insert 1/16" dia. wire rotor shafts (see plans).

After inserting and firmly gluing the shaft in Block 4, cut an oval pylon cap from ⅛" plywood. Drill a 1/16" dia. hole through the cap and glue it to the top pylon Block 4. Now glue assembled Block 4 to the previously glued unit of Blocks 1, 2, and 3.

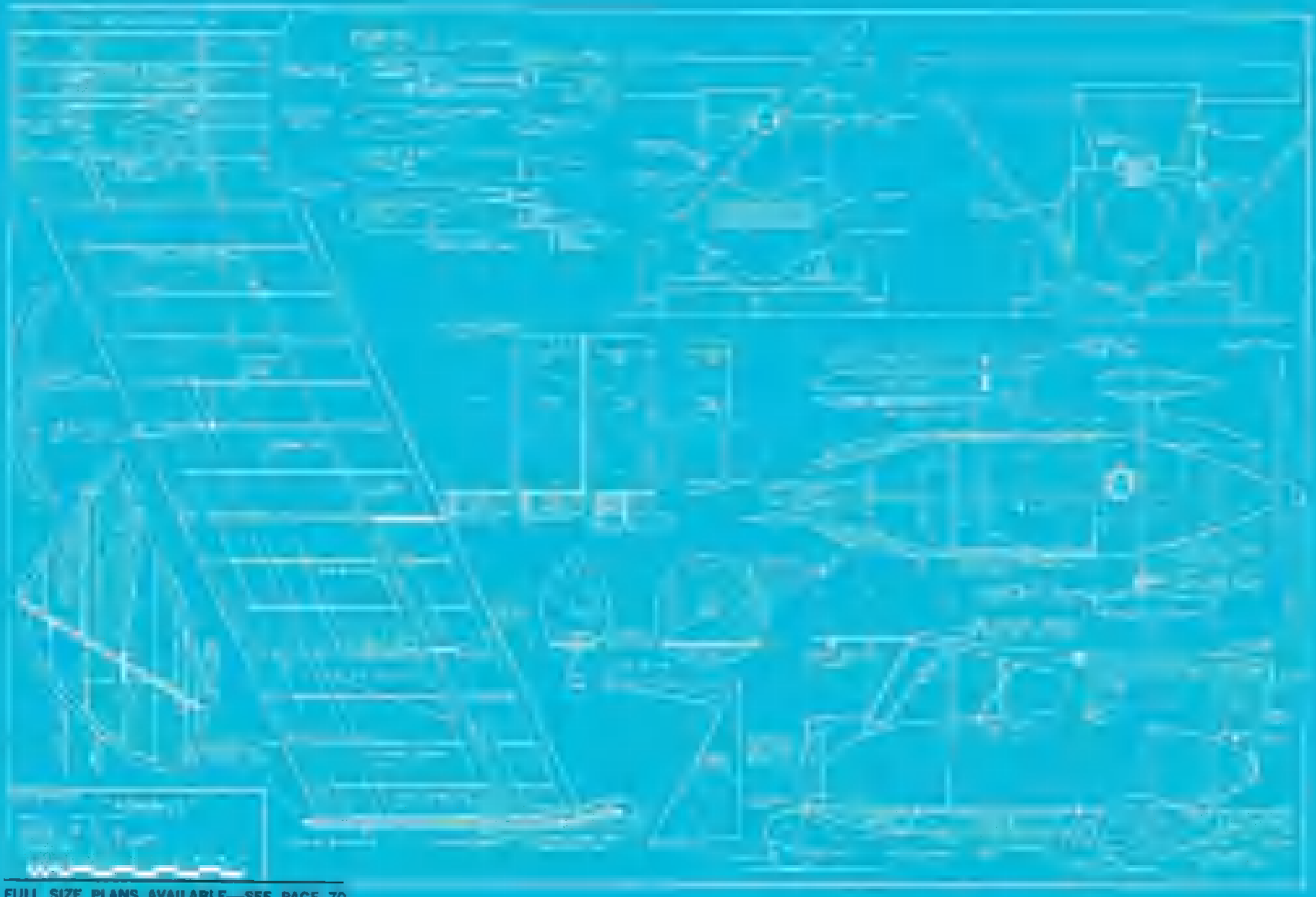
Allow the glued unit to set overnight, then bend the rotor shaft back 15 degrees from a vertical position. Use the joint line between Blocks 1 and 2 as the horizontal base line for measuring the angle with a paper template.

In the fuselage bottom, hollow out wells for ⅛" plywood landing gear platforms. Glue the well areas and insert plywood for nose and main landing gears. Cut the engine firewall from ⅛" plywood and glue into position, aligning carefully. The engine must be mounted with the thrust line at zero degrees. Add dummy air ducts, carved from ¼" sheet balsa, to each side of the pylon. Now the fuselage can be carved and sanded to shape and cross section. Glue the 1/16" plywood stab platform to the fuselage and check alignment. This platform, along with the stab chocks, will key the entire tail assembly.

Stabilizer and Rudders: Cut the stab from ⅛" sheet and sand leading and trailing edges round. All edges of all flying surfaces must be sanded round, since no special airfoil sections are used. Outboard rudders are cut from 1/16" sheet and the edges sanded. The mid-rudder is cut from 3/32" sheet. After it has been shaped, cut trim-tab and insert two soft aluminum hinges as shown. Trim-tab is located only on midrudder. Glue rudder and stab assembly, checking alignment. Attach ⅛" sq. balsa chocks to bottom of stab with glue. A ⅛" sq. balsa incidence block is added at the bottom of the stab, near the landing edge.

Rotor Hub and Arm Assembly: Cut

(Continued on page 73)



FULL SIZE PLANS AVAILABLE—SEE PAGE 70

Plane on the Cover

K&B 45 with [illegible] pitch 11-inch prop pushes the 7½-pound model through the air at realistic and safe speed. Electric motors power real wheels on the ground.

Aerobile

The flying wing roadable aircraft of 1937 makes a unique CL or RC model with removable wings and drivable "car."

[illegible] ANGEL

A COLORFUL PAGE in aviation history is occupied by the Waterman Aerobile, or "flying automobile." Many of flying's pioneers dreamed of [illegible] airplane that could drive through the streets like an automobile or soar cross-country on its wings. Two men, Molt Taylor and his Aerocar and Waldo Waterman with his Aerobile, came close to making that dream a commercial success. A limited production of the Aerocar was undertaken during the 1950's.

Mr. Waterman, a capable aircraft designer, worked actively for over 20 years on his craft, flying a total of six. The final version, first flown in 1957, is modeled here.

The full-scale Aerobile carried three passengers. It had [illegible] one-piece 38-ft. detachable wing. Power was a Tucker automobile engine, driving the propeller, or the wheels if on the ground. Top airspeed was 120 mph, landing sped 45 mph. As an automobile, it had a top ground speed of 70 mph and was licensed for highway operation in California.

The model is a little larger than 1/7 scale, having a 67-in. wingspan. It weighs 7½ lb. and is powered by a K&B 45 RC engine, turning in an 11-in. dia. pusher prop. The J. Roberts three-line control system provides engine throttle control. A battery-powered electric motor drives the wheels to demonstrate its automotive characteristics. The working headlight is controlled by [illegible] switch on the instrument panel.

The model is quite stable, although a little less weight or more power could be used. One unusual flying characteristic, caused by the line leadout location, should be mentioned. To avoid spoiling the scale effect by having leadout supports below the wing or by locating a bellcrank inside the cabin, the wires exit directly from the wing leading edge, well above the center of gravity. This causes the model to fly with a noticeable bank into the turn, which adds to the scale effect in slow level flight, but decidedly unnerves old control-line pilots.

How Terry Aldrich came to model the Aerobile is a story in itself. His job [illegible] a

The elevators also are operated differently for aileron control in real plane [illegible] in an RC model. Rudders move only outward. Wing and [illegible] removed for road travel.

professional photographer took him from California to Virginia. While there, he visited the Smithsonian Institution, in Washington, D. C. Out back, in a storage shed, he spotted the Aerobile which Mr. Waterman had donated in 1959. The Aerobile, like many other museum items, is awaiting its turn to be restored and put on display.

The Institution has the full-size copyrighted plans, which the serious scale enthusiasts might want, although they contain little additional detail. Copies are available for about $2.00 each by writing directly to the Smithsonian Institution, Washington, D. C. Missing from these plans is the center of gravity location. Terry contacted Mr. Waterman, who supplied this information.

The story of Mr. Waterman, his flying automobiles, and his other contributions to aviation is told in Paul R. Matt's **Historical Aviation Album, Vol. 3.** ($2.98, P.O. Box 33, Temple City, Calif.). This book also contains plans for a version (1937) of the Aerobile, earlier than the one featured here.

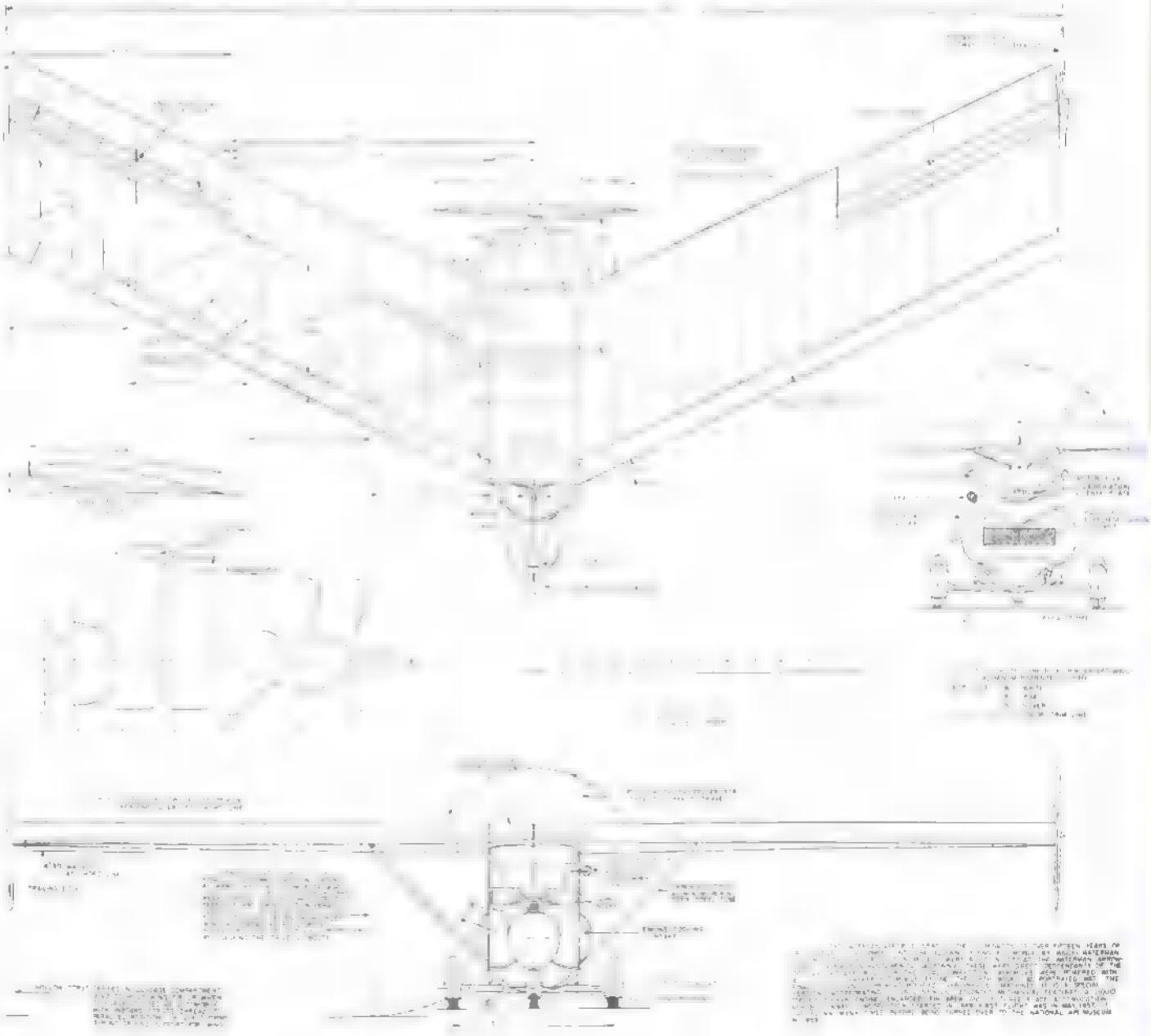
Construction

There are some minor variances between the model pictured and the finished plan. The electric motor wheel drive is omitted from the plan. Elimination of motor and batteries should solve the weight problem mentioned earlier. Those who want to add this feature should not expect their scrap piles to contain the same parts as ours did, so ingenuity must be used. The simple pencell and headlight switch also are eliminated to save weight; however, the penlight bulb still should be cemented into place in the headlight block for scale effect. The control line exit points were moved to the bottom of the leading edge, placing them a little closer to the CG and out of sight. A demountable wing, as originally used, is not recommended, or shown. The problem of disengaging control linkages was hardly worth the effort. Because of the compact body, space saved by detaching was minimal. Just attach the wing to the hardwood braces in the upper cabin by four 6/32 machine screws.

The plan is fairly complete, so no step-by-step construction instructions are necessary. However, one point in fuselage construction is not readily apparent. The fuselage is built up around a flat plywood platform (P-1), looking much like a skateboard during the early stages of construction. To conserve plan space, P-1 is not shown separately but must be traced from the fuselage top view, following the exterior fuselage outline along the sides, and following the dotted outline (marked P-1) fore and aft. Similarly, P-2 is a center keel which is shown only in the fuselage side view and must be traced from that view.

After cutting out P-1 and P-2, cement them together, then add the lower formers, F2A through F5A, and install the P-3 axle braces, axles, wheels, pants, etc., to form the basic fuselage "skate-

Three-views available from Paul Matt (address given in article). Note the 4½ degrees washout in each wing panel. This and the sweep back gave the Aerobile its remarkable in-flight stability.



board." Axles are ⅛" piano wire running inside full length tubing. The wheel pants, with axles epoxied into place, are the only means used for wheel retention. The short tubing between wheel pant and fuselage on the nose wheel must not be attached to the fuselage and should have 3/32" clearance to allow some movement. The axle brace is 5/32 brass tubing soldered to the brass axle housing and epoxied to the fuselage.

The Aerobile's cockpit is rather Spartan. All instrument panels and the steering wheel are flat black. The front seat is a single semi-bucket type, while the rear seat is a bench type, seating two persons. These can be made of balsa. Note that there is a door on the right side only, and the rear cabin strut on that side is slanted instead of vertical.

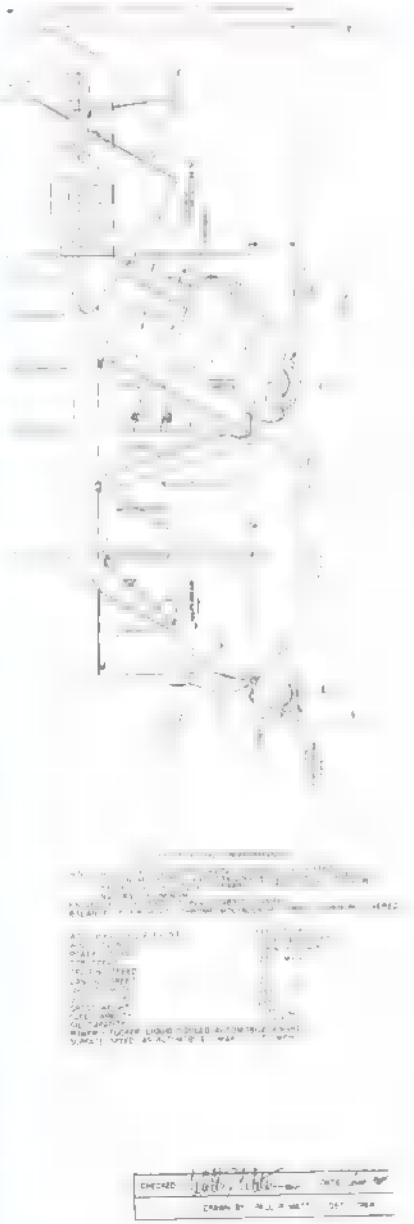
The motor mounts are spaced for the K&B 45 RC. Spacing (width) for the builder's engine should be verified and altered if necessary. The airscoop of carved balsa is a working one and allows some air circulation through F-6 and around the engine. The engine on the model was exposed, although the plans show the scale outline in the event the builder wants to install a screen around the engine. The carved balsa scale prop is replaced for flying by a regular 10-6 pusher prop. Concealed rubber bands hold the removable engine top block in place, although screws into the motor mounts would work nicely.

Aerobile is an odd one in flight, yet easy to fly; however, the short wheelbase requires a smooth landing. Prop in back won't break.

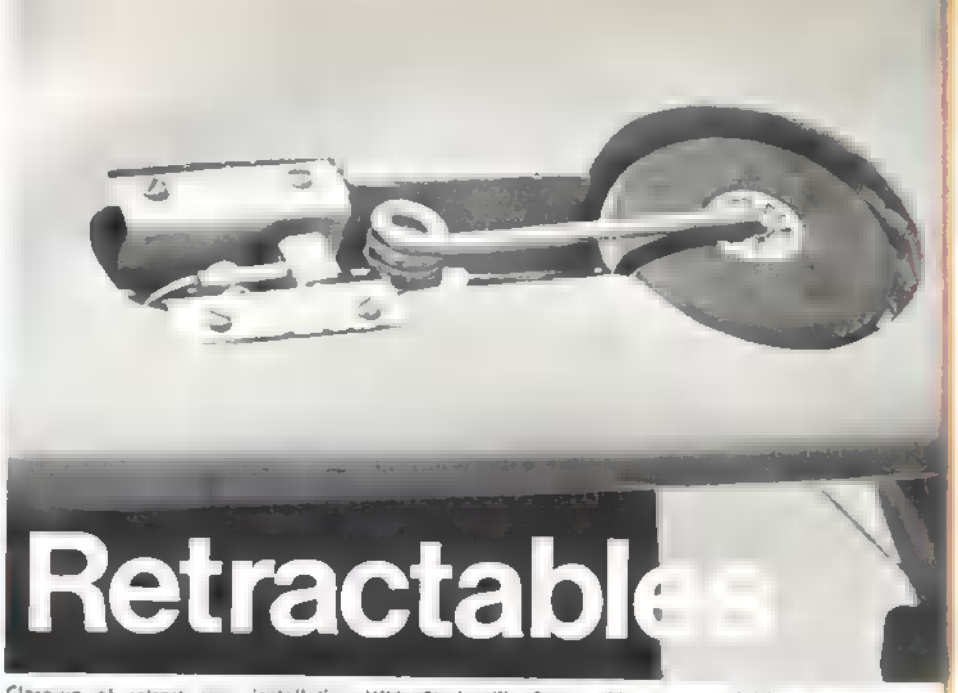
Wing construction is fairly straightforward. The three-piece sandwich construction of the tip rudders was found necessary to eliminate warpage with the silk covering. The wing elevons are rigged to work up and down together as elevators only, for control-line flying. The control movement is transmitted to the elevons by torque, or rotational movement of the torque rod. The three torque-control horns should be made of steel and silver-soldered to the torque rod. It will be necessary to splice the torque rod for sufficient length by sweat-soldering two ends into a common piece of 3/32 ID brass tubing. A small bellcrank must be cut down to make the transfer bellcrank shown on the plans.

Due to the wing sweepback, the elevator pushrods operate with a slight sideways movement as well as fore and aft. Be sure to provide sufficient clearance for this movement in the pushrod exit plate on the outer wings. Plywood ribs are used for all outer ribs to prevent warpage by the silk covering. This includes the outside elevon ribs and the wing ribs adjacent to the elevons. The wings should be covered with silk before cementing the rudder assemblies into place.

As with any scale model, the final degree of finish and detail depends on the individual. This is where the winners stand out from the other nice-looking airplanes. It's up to the builder to figure out what materials to use and how to make the rear view mirror.



Last version of real plane resides with the Smithsonian Air Museum in Washington, D.C. It was licensed as motorcycle for road use!



Year of the Retractables

Close-up of retract gear installation Whit Stockwell's Pagan. No door or fairing is used. Power is 180-degree servo. Two-wheel gear needs thin wheels near leading edge.

For the most points in Scale and optimum performance in Stunt, retractable landing gears are becoming a necessity! The survey considers both old and new commercial systems.

HOWARD McENTEE

Photos by Frank Pierce

RETRACT GEARS have been on the market for over ten years, yet they have not become popular. Although they enhance performance, added weight and cost, plus possible unreliability, have prevented wide acceptance. However, the 1969 World Championship RC Stunt win of Bruno Giezendanner focused attention on them because of improved performance. The 1970 competition season may be the "Year of the Retractables."

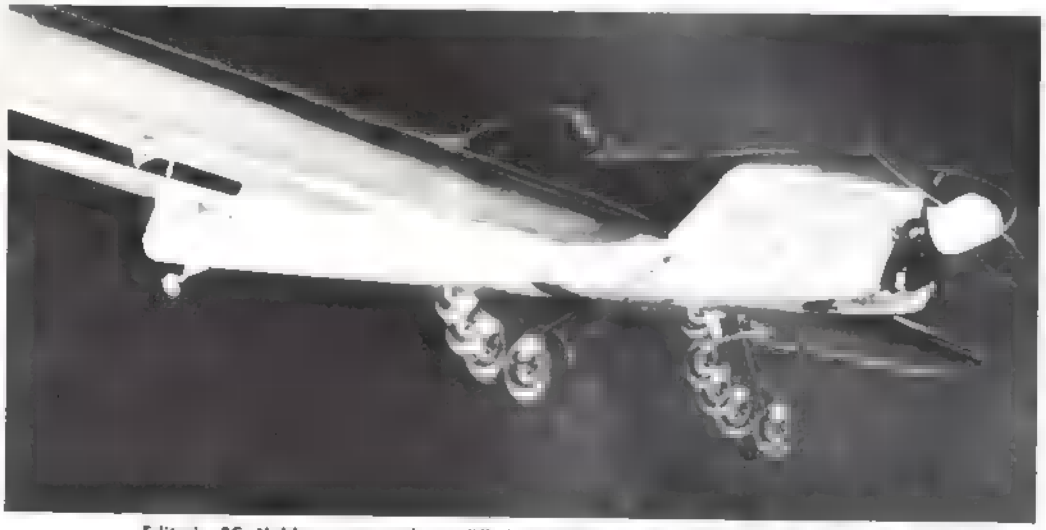
They do reduce drag, although [illegible] figures on drag reduction for typical stunt planes have been seen. Most stunters are sleek, with low drag, except for that fixed tricycle landing gear! Those who have flown RLG (retractable landing gear) say the way planes [illegible] through tough maneuvers with the gears folded is a revelation. Observers can see a plane jump forward when the LG retracts!

The RLG field divides into three distinct types: electrically-driven systems with motors built into each wheel unit; pneumatic systems which also have a power unit for each wheel; and non-power-equipped wheel units. External servos are applied to work one or more of these, and almost any servo can trigger the units which have their own built-in power—electric or pneumatic.

Switches or valves require only a few [illegible] of operating power at the most. It is practical to operate electric systems from a special amplifier hooked to an unused control on a multi-digital system. Or simply link the switch or valve to the throttle (or other) linkage. Wheels-down seldom is used unless the engine is in low throttle. For takeoff, arrange the linkage so that the throttle, or the linkage itself, goes 80% of the way to wide open, then advance it the remaining 20% to actuate the retracting switch [illegible] valve. The wheels can be dropped at any desired lower throttle position.

For RLG's that have no built-in power or spring assist, standard servos should be avoided. Needed here is a rotary-output servo that can provide 180 degrees rotation of the output disk (Fig. 1). While most LG units have internal locks that take all landing shocks off servo and linkage, these locks may not always work. If the gear goes down, for example, but fails to lock, a rough touchdown can put a serious load on the servo gearing and even the motor. Any shock is taken entirely by the servo output disk and, possibly, its shaft. If these are sturdy enough, no harm can be done to the servo.

Many servos do not have enough throw to operate RLG's directly, and some may lack necessary power. Most landing gear servos now marketed (EK Products, BK Model Products, Kato Model Aircraft, Royal Products, Kraft, Pro-Line, and Orbit) have the desired angular rotation and sufficient power. With careful attention to attaining friction-free linkage, and with shorter LG



Editor's RC Nobler uses much modified Positract [illegible] pivot the gear legs at point of exit from fuselage. Looks good in flight and raises the center of drag.

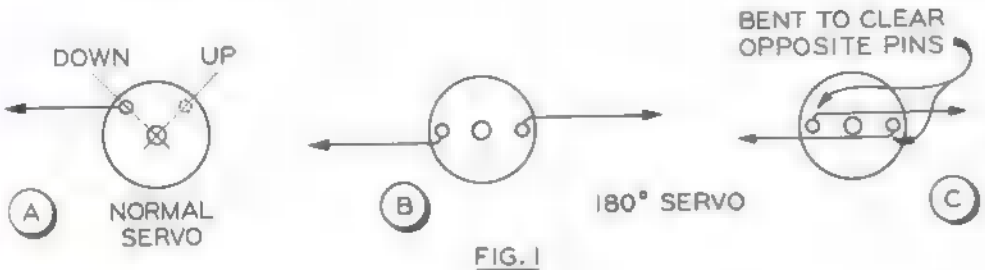


FIG. 1

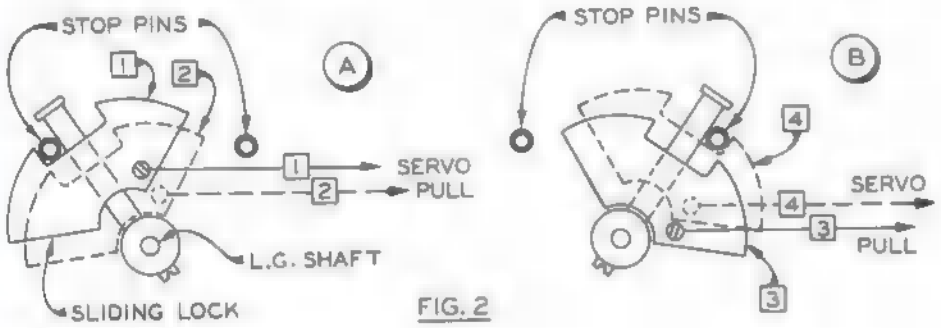


FIG. 2

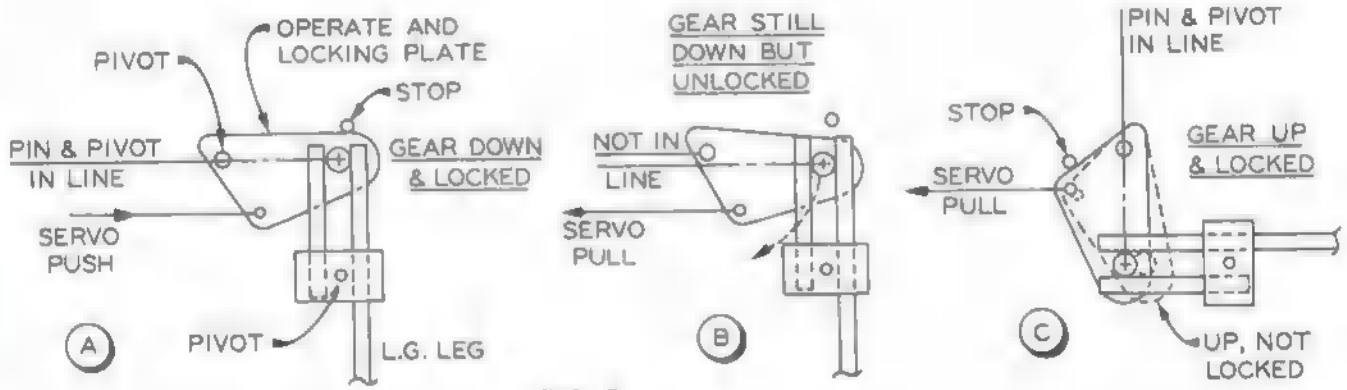


FIG. 3

legs and smaller wheels, one possibly could operate a trike RLG system from a single such servo. However, it is preferable to utilize one servo for the nose gear—this leg is often longer and heavier than the main gears—and another servo for the two mains.

Each of the servo systems has its pros and cons. Generally, pneumatic units are larger, and sometimes heavier, than electric units. Those that work from engine pressure require no added power. However, newer systems that work from compressed gas must carry this gas in an extra container. Such systems generally operate on Freon gas, widely used as a refrigerant. Some modelers have found that in cool weather several operations of the system can cause it to "freeze" to a modest extent. RLG systems normally operate only once at the beginning of a flight and once at the end, so this may not be a great problem.

Overall weights of the system vary greatly. When figuring weight for some RLG's, one or more servos, a switch (or valve), and perhaps separate servo batteries must be added. If it is possible to carry the weight, separate set of cells should always be used for electric servos, in addition to the normal control system power pack. Not that the power pack can't stand the extra drain; it is brief and only needed twice per flight. But it is ■ mechanical-electrical fact that RLG servos can jam. The lighter-weight 450-mah nickel-cads recently introduced by Gould are ideal, alkaline pencells probably could be used satisfactorily too.

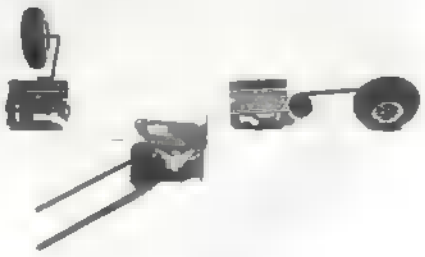
Electrical noise could bother digital receivers. The only electrical RLG's in this survey have capacitors across the motor brushes and low-resistance radio frequency chokes in the motor leads. Modern digital equipment systems are not as sensitive to such interference as the early ones, which probably is why all-metal retract units ▬ now usable, whereas they might have upset early digital receivers.

Even the best-engineered systems can develop bugs. The average RC'er can do things to equipment that the designers never thought of! Probably the best way to check the various retract systems is to "Ask the man who owns one." Attend the larger Stunt contests, observe which RLG systems are in use and how they behave, and ask the users for recommendations.

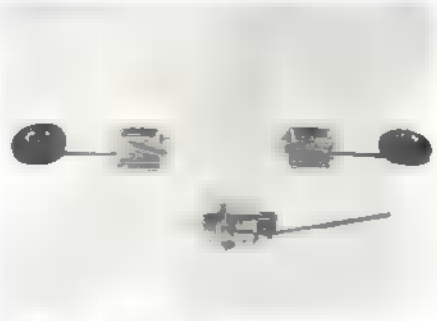
Unit Descriptions

THE BK UNITS work on such a simple principle that sketches of the action (Fig. 2) are included. BK RLG's have only two moving parts, yet give smooth and positive action. Bill Bertrand introduced this scheme of operation back in 1965; sketches appeared in **AAM** (Ref. 8). BK has simplified the arrangement mechanically. In Fig. 2A the 1's indicate one extreme of motion—gear either up or down and locked. Operation is as follows: the semicircular block slides down and away from its lock pin, then moves the gear through 90 degrees to the opposite stop pin and the block slides diagonally upward until it locks the action again. Thus, ■ continuous servo pull unlocks, moves the gear leg 90 degrees, and relocks—exactly the same going either up or down.

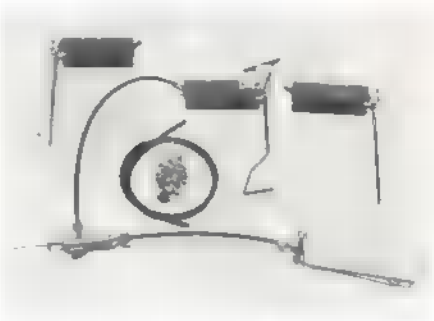
The BK units are constructed of heavy ¼" linen phenolic. Bearings are holes in ⅛" aluminum channel, which also provides mounting. LG legs have two-turn coils of 5/32" music wire and a slight offset bend. However, they are left



Royal Products RMK special.

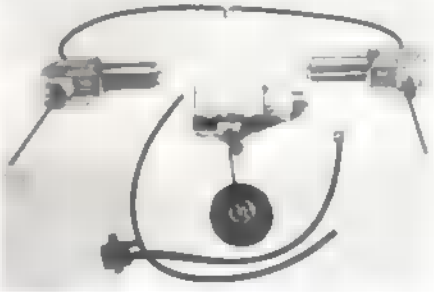


Selectronics CAS System.

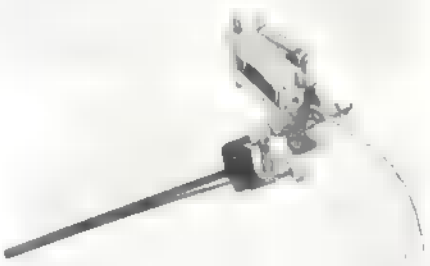


Nelson Model Products Rowan.

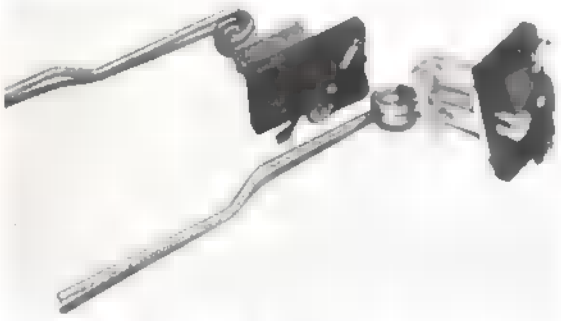
Technisales KDH German units.



Never Fail retractable gears.

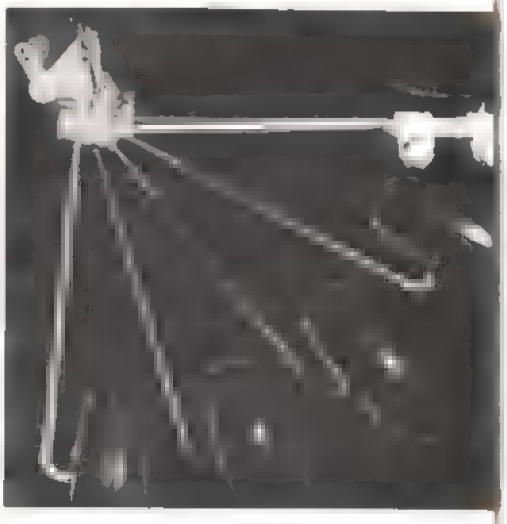


Wing Mfg. Positract nose unit.

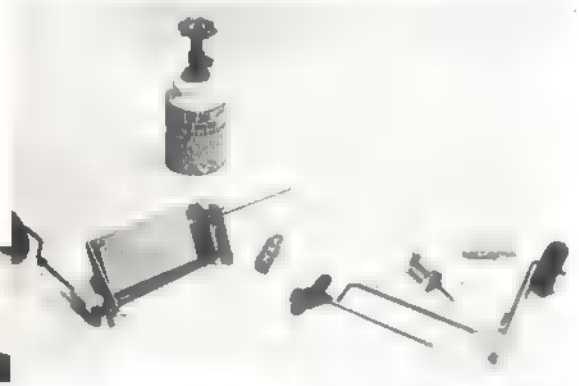


BK Model Products main gears.

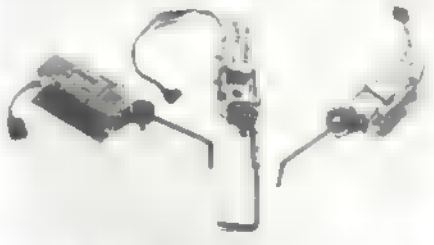
Royal MK and 180-degree power servos.



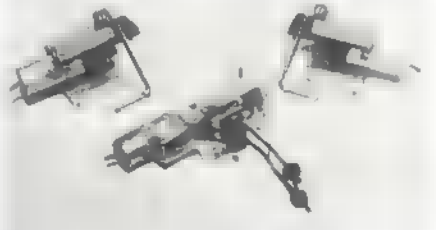
English Micro Mold gear from Bob Holman is unusually simple. Torsion bar mounted.



P.M.W. power unit, ram, airborne cylinder and P-40 gear on left and P-51-type gear at right. No spring assists.



Editor's old DMECO units [redacted] modified. Nose gear was bolted to engine's backplate. A sequential system.



Pneumatic Cletus Brow system operates from engine crankcase pressure.

straight on the end and may [redacted] cut and bent to suit. Some hints for improvement with [redacted] counter spring appeared in AAM (Ref. 9).

THE CLETUS BROW SYSTEM, no longer marketed, has seen much use by prominent fliers. Each unit has a bent frame of thin sheet aluminum, which holds the operating cylinder and the gear leg mechanism. Nose gear is steerable and [redacted] a two-leg type utilizing 3/32" wire. The legs lock solidly when down, pneumatic pressure holds them up. As noted above, the wing gear units are based upon the [redacted] mechanism, but the locking feature with gear retracted has been eliminated. A small valve [redacted] supplied to control pressure bled from the engine crankcase to the cylinders. As with similar pneumatic units, if the engine stopped during flight, spring pressure, assisted by wheel weight, was expected to force the gear down and lock it.

THE DMECO ELECTRIC UNITS were simple and rugged; nose and wing units were almost the same, easily convertible from [redacted] to the other. A rugged aluminum extrusion formed the frame and metal gears were utilized. Limit switching [redacted] built in. The motors always rotated in the [redacted] direction; and the current drain of [redacted] single unit could rise to 1 amp or more when raising the wheel. Therefore, switching was arranged to move the wheels in sequence; one was almost completely moved before the next in line started. Cycling was so rapid that it looked as though all the wheels moved together. Some users had trouble with the gears getting out of sequence—one up and two down, for instance. Thus, some installed separate batteries (Ref.

SPECIFICATIONS TABLE

MAKER (IMPORTER)	TRADE NAME	NOSE GEAR WEIGHT	MAIN GEAR WEIGHT	TRIKE SYSTEM WEIGHT	MAX. DIM. NOSE UNIT	MAX. DIM. WING UNIT	TRIKE SYSTEM PRICE	REMARKS
BK MODEL PRODUCTS	BK	NONE YET	2.55 OZ. EACH	5.1 OZ *	NONE YET	1-1/2 X 1-3/4 X 2"	$14.95 *	NO NOSE GEAR AVAILABLE
BOB HOLMAN	M.M.	NONE YET	2.98 * *	5.92 OZ. PAIR	NONE YET	1-3/4 X 2 X 1-3/4"	$20.00 PER PAIR	NOSE UNIT NOT READY YET
CLETUS BROW	BROW	4.7 OZ.	3.43 OZ.	13.0 OZ.	2 X 6 ■ 2-1/8"	1-5/8 ■ 2-1/2 X 4-1/2"	NO LONGER MADE	WING UNITS CONSIDERABLY MORE COMPACT
de BOLT MODEL ENGINEERING	DMECO	5.0 OZ.	4.9 OZ.	15.0 OZ.	1-1/8 X 3-1/2 X 1-1/2"	1-1/8 X 1-1/2 X 3-1/4"	NO LONGER MADE	NOSE AND MAIN UNITS ALMOST IDENTICAL
NELSON MODEL PRODUCTS	ROWAN	3.1 OZ.	2.57 OZ.	11.17 OZ., FULL TANK	2 X 5 X 1-3/4"	1-1/8 X 1-3/4 ■ 4-7/8"	$ 89.95	PRICE INCLUDES 4 OZ. TANK OF GAS
NEVER FAIL RETRACTABLE LANDING GEAR COMPANY	NEVER FAIL	6.2 OZ.	4.8 OZ.	16.8 OZ.	2-1/2 X 5-1/2 X 2-3/4"	2 X 2-1/4 X 6-3/4"	$ 70.00	WITH WING UNITS THAT RETRACT WHEELS STRAIGHT BACK, $85.00
P.M.W.	P.M.W.	NONE YET	NONE YET	1.3 OZ. EMPTY	NONE YET	NONE YET	$ 38.50	FILLED CARTRIDGE RAISES WEIGHT ABOUT 1/4 OZ.
P.M.W.	PR-1	NONE YET	2.0 OZ.	4.5 OZ *	NONE YET	1-3/4 X 1-3/4 X 7-3/4"	NOT AVAIL.	TORSION BAR INCLUDED IN LENGTH BUT NOT OPERATING RODS
P. M. W.	PR-2	NONE YET	3.8 OZ.	7.9 OZ *	NONE YET	1-1/2 X 4 X 7"	NOT AVAIL.	PLY MOUNT INCLUDED IN SIZE BUT NOT OPERATING RODS
ROYAL PRODUCTS CORP.	MK	2.95 OZ.	2.0 OZ.	6.95 OZ.	2 X 3-3/4 X 1-3/4"	1-1/2 X 2 ■ 3-1/2"	NOT AVAIL.	TWO MK SERVOS ADD 4.1 OZ. TO SYSTEM WEIGHT
ROYAL PRODUCTS CORP.	RMK SPECIAL	4.2 OZ.	2.5 OZ.	9.2 OZ.	2 X 2-1/4 X 1-3/4"	2 X 1-1/4 ■ 1-7/16"	$ 34.90	SYSTEM WEIGHT LESS SERVOS; RMK SPECIAL TWO SERVOS ADD 4.1 OZ. TO COMPLETE SYSTEM
SELECTRONICS COMPANY	CAS	3.5 OZ.	2.65 OZ.	9.2 OZ.	2-1/8 X 1-1/4 X 1-7/8"	2-1/8 X 1-1/4 X 1-7/8"	$ 43.90	SIZE DOES NOT INCLUDE OPERATING ARM PROJECTION
TECHNISALES	KDH	4.1 OZ.	3.05 OZ.	10.2 OZ.	1-7/8 X 2-1/4 X 1-7/8"	1-1/4 X 2 X 1-7/8"	$ 66.90	PROJECTING LINKAGE ARMS NOT INCLUDED ■ SIZES
WING MFG.	POSI-TRACT	3.87 OZ.	3.60 OZ.	10.87 OZ.	4-1/4 ■ 2-1/2 X 2-1/2"	2-1/2 ■ 2-1/2 X 4-1/2"	$ 57.90	DUST COVERS, 95¢ PER RLG UNIT

* TWO WING UNITS ONLY. * * LONG TORSION BAR INCLUDED IN WEIGHT BUT NOT IN SIZE.

1) and altered switching to move all wheels together.

The remedy for these rugged and simple units is to install in each the small motor used in the Orbit PS-4 servos. The larger motor used in their PS-3 servos can be adapted, but requires much filing on the case. Order these motors from the factory, specifying long shafts (shafts are cut short for servo use). With these lower-drain motors, all servos could be operated together, keeping the battery drain within reason and eliminating the out-of-sequence bugaboo. Hal deBolt suggests an Ace RC amplifier (kit #25K108) to operate the modified servos direct from an unused digital receiver channel; this amplifier was intended to power electric brakes.

THE KDH UNITS, ■ German import, are entirely metal, beautifully made, all parts plated or anodized. Side frames are aluminum. Nose and main gears are somewhat different, although both work the same. These gears lock both up and down. Operation of the main parts is shown in Fig. 3. Servo linkage is arranged to keep a little pressure on the triangular plate, so that it will stay firmly against its stop pin. When locked, the triangular plate pivot and the heavy peg on this plate are in line; all shock is taken between these two points, none on the linkage.

These RLG units have adjustable coil spring assist. The nose gear requires about ¾" linkage movement for full cycling, the wing gears about ⅝". Keep this in mind when mounting or the linkage won't come out right. The nose gear mounts to the firewall and is steerable. Technisales will stock their Cushionaire knee-action steerable nose gear strut to fit the KDH unit.

Another style RLG unit by KDH, intended to retract two wheels rearward, is fine for pylon racers. New Mini units will soon be available in the ■■■ design, but about 20% smaller all around.

MICRO MOLD UNITS are ■■ English import, very compact and light. At this writing, only wing units are available, but a nose gear is coming soon. The entire mechanism of the wing units floats on ■ 6½" torque rod of 5/32" music wire. The units ■■■ mounted with these torque rods in the wings just as non-retract wing struts are normally installed. The maker furnishes routed hardwood strips for this purpose. ■■ well ■■ torsion rod clamps and screws.

At first glance these wing units look a little flimsy, especially compared to some of the larger units included in this survey. Closer examination shows that all parts which support the wheels are amply strong, and the units should stand abuse well. Spring-assist is featured on wing units and is adjustable to stunt length and wheel weight. The units afford positive locking, extended and retracted. They require about one inch of servo movement. Units are right- and left-handed, wires are bent for wheels.

MK RLG's, distributed by Royal Products, are almost entirely plastic. The steerable ■■■ gear is set up for firewall mounting. All units operate on the same principle as those of BK (Fig. 2). Main gears require about 13/16" linkage movement, nose gear about ⅞".

MK makes two difficult, highly-geared servos, one for both wing units, and one for the nose unit. Those servos are quite compact, have 180-degree rotation and built-in limit switches. Switching is such that the main gear servo moves about halfway, then causes the other servo to move. With two wing gear units and three-in. Lo-bounce wheels, maximum current drain of this one servo was 175 ma, which came as the gear neared up position, on 2.4V. There is no spring assist.

Servos utilize the same type of motors

(Continued on page 58)

Spinks Akromaster

60-powered model has all the fine aerobatic abilities of its full-size counterpart. Lines are simple and easy to duplicate.

ROBERT SCHULTHEIS

AFTER LAST SUMMER'S air show at Rockford, a flying buddy told me about a slick white aerobatic ship he'd seen. Not too good at names, he called it a Schlitz or Schmitz Akromaster. Well, I like planes such as Chipmunks, Zlins, and Yaks, so this was natural for me. Then AAM (Feb. 1970) published a detailed article and a beautiful scale three-view of the Spinks Akromaster. I was hooked!

The bomber I was building was set aside, and I started drawing this pretty ship with its perfect RC Class III proportions. Except for the 520-sq.-in. wing area, the Akromaster has all the right moments. The only curve in the whole plane is on the top of the fuselage.

The symmetrical wing, as experience and other flier's comments indicate, makes for better aerobatic models. The real plane used the semisymmetrical NACA 2413. The tail group is scale size. A few builders may question the area, but those doubts are completely dispelled after the first flight. That little stab and big elevator do a fine job.

Another unusual feature is a fuselage six inches wide. Try to put that in an old multi-cradle! I usually start the motor with the plane inverted on someone's knee or in a cradle, but it can be started right side up. Holding that wide oily fuselage requires a hand like Wilt the Stilt's, but it can be done.

Construction

Start with 3/16 x 4 x 36" medium balsa sheet, add 3/16 x 2 x 17" doublers and 3/8 x 1 x 17" stiffeners. A piece of sheet about 2¾" long must be added at the tail. The 3/16" tail doubler will hold all this construction together. Mark former locations on the sides. Then, with sides stacked together, jig saw and cut to shape.

Formers 2, 3, and 4 are cut from ¼" hard balsa. The ¼" ply firewall (F1) can be added to the stack and all of them cut at one time. This keeps the width uniform and the notches in line. Now glue F2, F3, and F4 to one side. Also glue in F1 after attaching the motor mount. The Tatone mount is fastened to the firewall (F1) with 6-32 Allen bolts and blind nuts. Prepare the firewall to receive the motor mount and install the blind nuts. Cut ¼" from the bottom of the Tatone motor mount, so that it will fit under the ½" balsa fuselage top. Drill another hole in the bottom of mount to replace the one cut off.

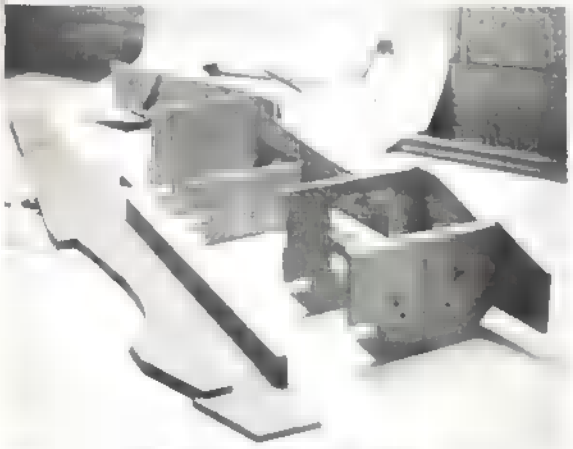
With the four forward formers glued securely to the sides, make a cut, about two thirds of the way through, on the inside of fuselage side, behind F4. This can be done with a coarse hacksaw blade held in the hand. When the tail is pulled together, this cut enables the sides to bend at the angle shown on the drawing. It is not a smooth curve but a sharp angle. Both the three-views and photos show this.

Now bring the sides together at the rear and glue. Insert the tail block. Run some glue on the previously notched sides and attach some ¾" triangle stock braces behind F4. Glue in F5 and F6.

The fuel tank is installed next, and the lower nose pieces glued in place. Epoxy ⅛" ply on front and rear of the

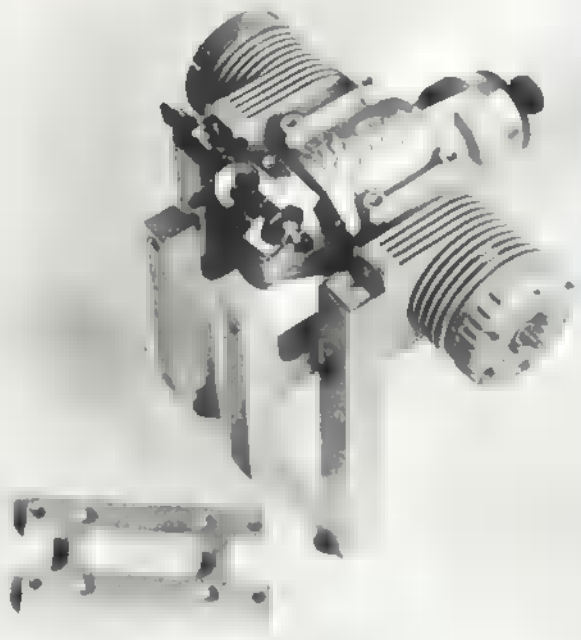
(Continued on page 71)

ABOVE: The model's only deviation from exact scale is the use of symmetrical airfoil for serious-type stunting. Conventional landing gear works out well on this plane; takeoff and landing are bounce-free. Naturally, crosswind operation is tricky.



Rugged construction and wide fuselage characterize Akromaster. Scale three-view in background appeared in recent AAM article.

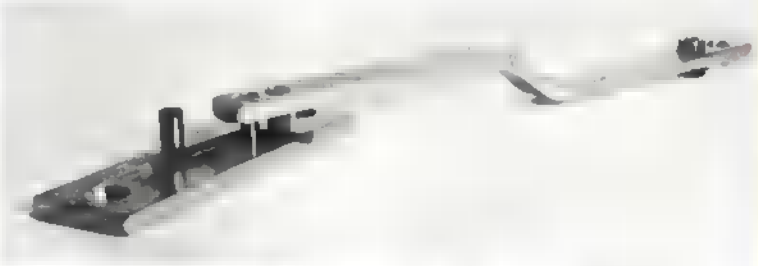
BELOW: Looks real, doesn't it? Maneuverability and precision are impeccable. A full-size Akromaster took third at recent Aerobatics Championships. U.S. won team first.



Concord and West Mfg./Ross Twin Glow 60. American-made RC motor is smooth-running, simultaneous-firing, common-centerline twin with special Kavan carb. Dependable idle and power for big props. Choice of mounting radial or beam, exhaust stacks or mufflers available. $125. Concord and West Mfg. Co., 255-03 West End Dr., Great Neck, N.Y. 11020

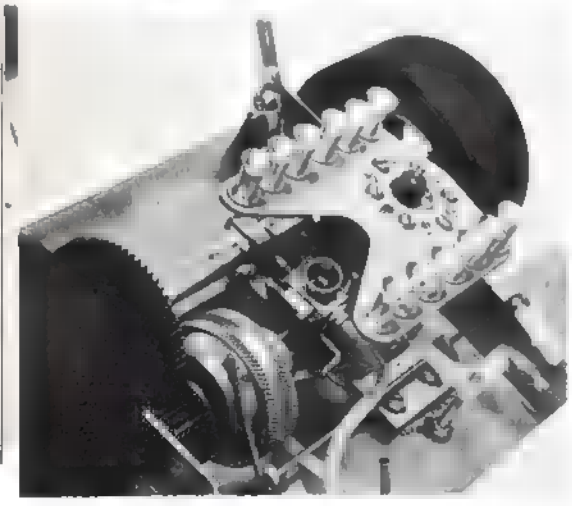
NEW PRODUCTS CHECK LIST

FRANK PIERCE



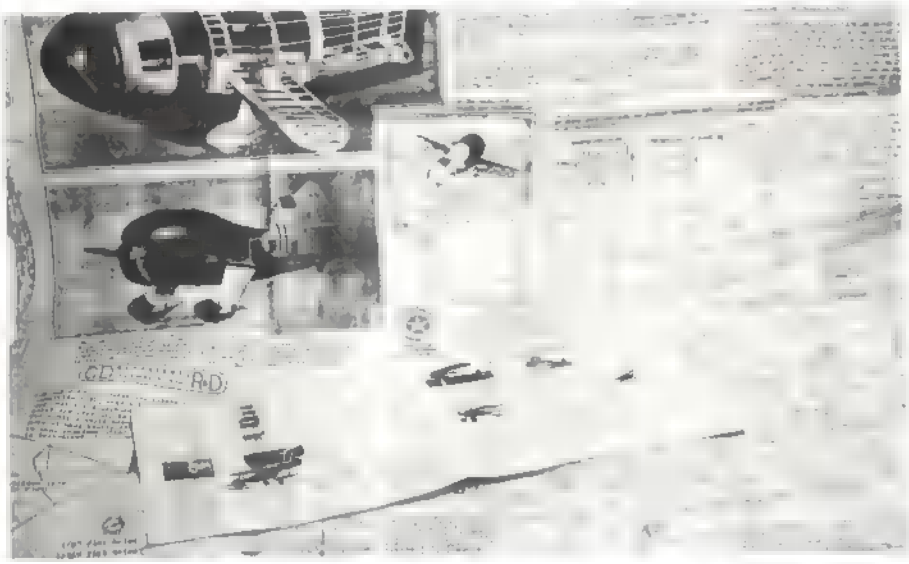
Brolton Products/Right-angle wire bender. Precision tool permits accurate bending of 5/32" or 3/16" wire to smooth radius. Also available, coil-bender attachment for forming your own landing gear. Price, under $7, depending upon wire gauge size. Details, write **Brolton Products**, 100 E. Byrd St., Appleton, Wis. 54911

Model Engineering/Wing carrier. Great for 'wagons or family sedan, heavy-duty brackets have no-slip surface, keep up to six wings up and out of the way. Quick to install, quick removal when not in use. $9.95/set. **Model Engineering**, 3655 Calumet Rd., Decatur, Ga. 30034

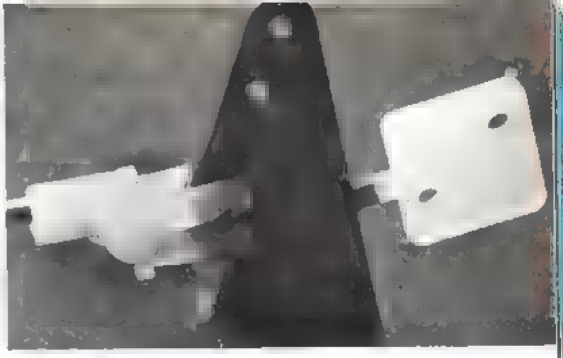


Dynamic Models/Race car heat-sink. Gets rid of heat in enclosed engine applications and adds note of handsome realism. Variable efficiency, sink can be used with asbestos washer for winter applications if desired. $4.95 including washer. **Dynamic Models**, 13309 Saticoy St., North Hollywood, Calif. 91605

AAM's own/Far-out insignia. Show your true feelings for your favorite mag. Sport the **Great AAM Bird** roundel on your fuselage, field kit, car window. Instant-stick plastic, no water necessary. 3" diameter, 25¢. Also **Tenderfoot insignia**, great for dressing up Delta Darts, 15¢. Order direct from **American Aircraft Modeler**.



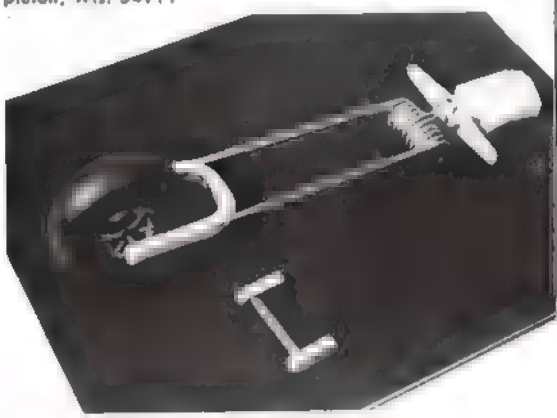
Cleveland Model and Supply Co./Hundreds of plans. Where else can you find 1½" scale plans for GeeBee racer or detailed miniature drawings of rare early birds? Cleveland is now [illegible] chandising complete line of plans from '30's and '40's kits. Catalog provides complete listing. **Cleveland Model and Supply Co.**, 4506 Lorain Ave., Cleveland, Ohio



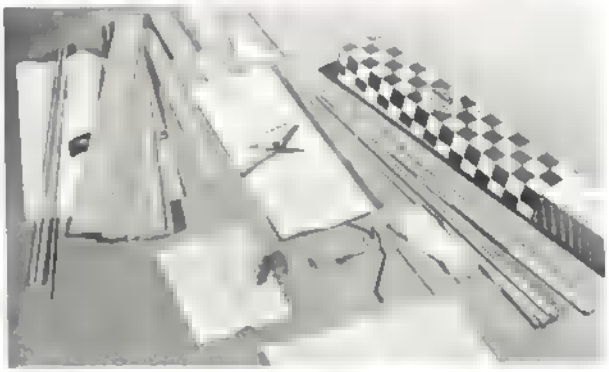
Carl Goldberg/Snap'r Keeper. Pushrods won't become disengaged when firmly locked in place with new CG product. Easy to install or [illegible]. [illegible] for 50¢. **Carl Goldberg Models, Inc.**, 2545 Cermak Rd., Chicago, Ill. 60608.

Breiten Products/New nose gear. Steerable, gear features quick disconnect lock for easy transport. Firewall-mounted, 3 oz. less wheel. Available with standard axle or curved yoke for $1.90 extra. Gear with standard axle, $7.95. **Breiten Products**, 100 E. Byrd St., Appleton, Wis. 54911

Rexco/Permabond. New semi-contact high-strength adhesive has many modeling applications. Sets firm in less than [illegible] minute, joins woods, nylon, metal, plastics, with either similar or dissimilar bonding. No heat or catalyst required. Complete data sheet provides [illegible] details. In several convenient sizes. **Rexco Corp.**, 45 [illegible]. 47th St., New York, N.Y. 10036

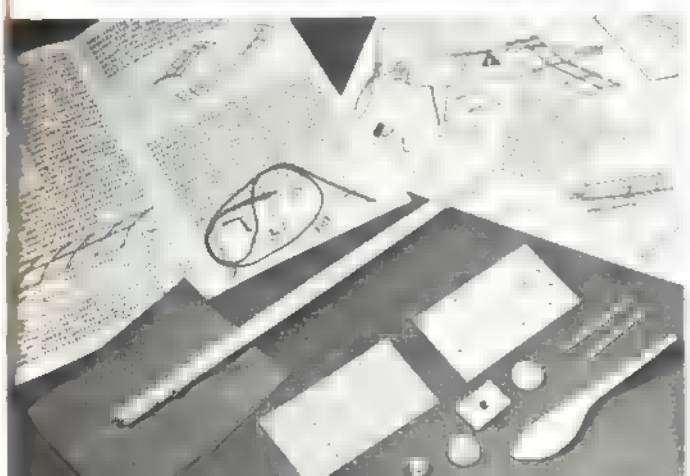


Min-X/Audio-tac. Audio tachometer operates [illegible] two 9V cells, provides accurate calibration of engine [illegible] [illegible] 1%. Peak out engine, tune Audio-tac to same note and read rpm's from calibrated dial. $24.95. **Min-X Radio, Inc.**, 8714 Grand River, Detroit, Mich. 48204

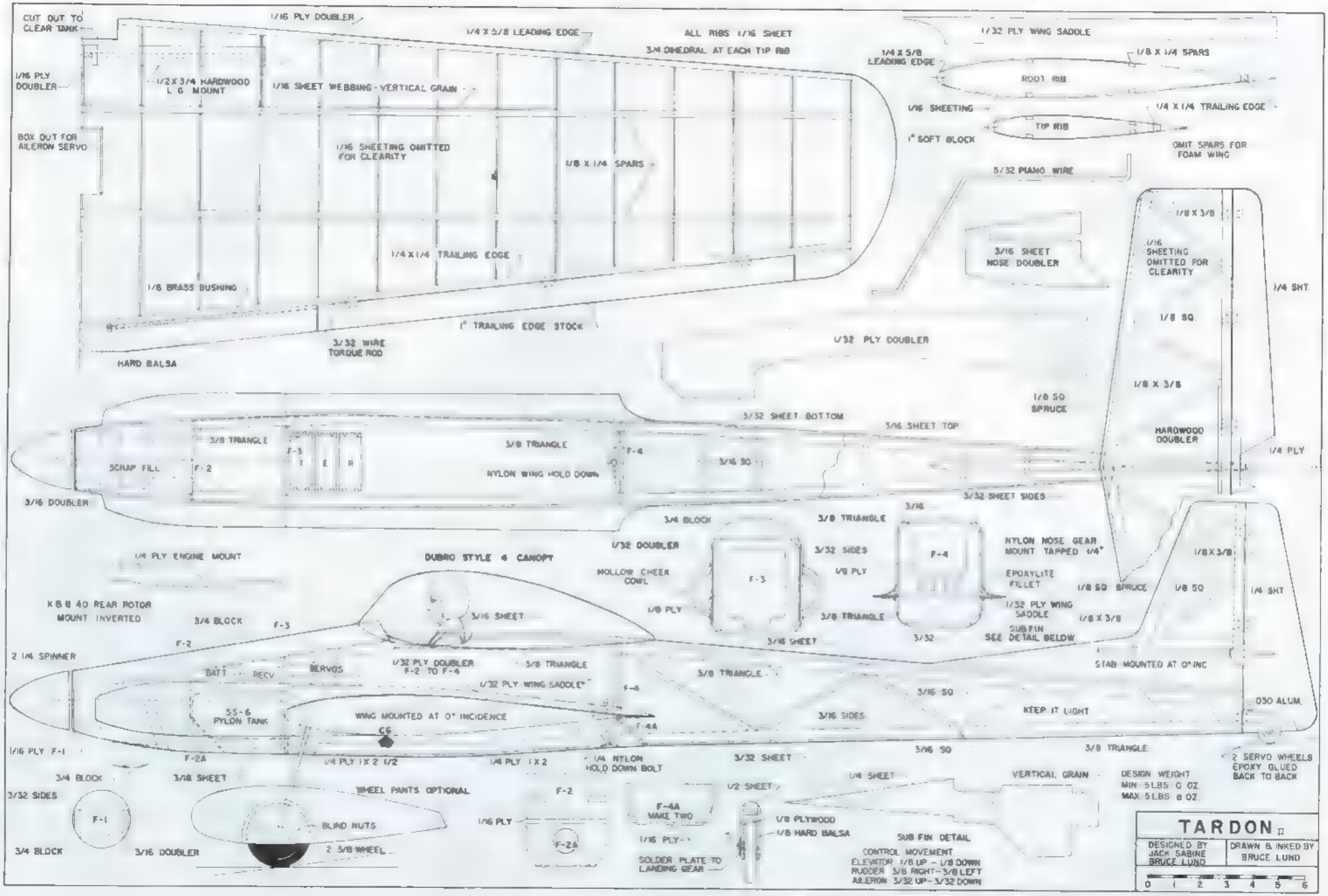


Dumas/Evolution trainer. Shown in kit form, model can be flown in three configurations. Add wing-tip extensions and fly as 75" span, 09-powered RC trainer. Remove gear, add power pod and fly [illegible] thermal [illegible]. Or fly [illegible] hotter 48"-span sport plane. $19.95. **Dumas Products, Inc.**, Box 6093, Tucson, Ariz. 85716

Marlow Engineering/Shark rubber-powered. One of a line of new lite-weight, built-up rubber-powered ROG's and gliders, kit provides detailed plans, all material, plus detailed instructions. For the successful Delta Dart graduate. **Marlow Engineering**, 6850 Vineland Ave., North Hollywood, Calif. 91605



J. W. Caler/New WW II aerobooks. Two new ones from Kookaburra publications in Australia provide details [illegible] planes used in film **Battle of Britain**, and development of **Hawker Hurricane**. Both well detailed with lots of pix and three-views. Well printed with good color. $1.95 [illegible] **John W. Caler Publications Corp.**, 7506 Clybourn, Sun Valley, Calif. 91352



FULL SIZE PLANS AVAILABLE—SEE PAGE 70

Tardon

Attractive non-scale Formula II winner at '69 Nats is also a fine small-size pattern plane.

JACK SABINE and BRUCE LUND

Jack Sabine displays the fairly long high-aspect ratio wing which gives Tardon its fantastically quick pylon turns.

TARDON II WAS conceived at 20,000 feet over Mexico, while Jack Sabine and I were returning from the 1969 Mexican Nationals. Jack had just won the Open Pylon event with his "Tardon." In Spanish, Tardon means slow or pokey. Surprisingly, some of the local Mexican contestants had come over to ask what it meant—seems our dictionary was for Castilian, rather than Mexican, Spanish.

Thinking ahead to the Nationals to be held in Philadelphia, we realized that Tardon needed modifications to fit the recently revised AMA rules. Should new wings be built to meet the 1½-in. rule, or should a completely new plane be designed? The frontal area of Tardon could be reduced by placing the cheek cowls down on the wing like a Rivets, and the wing could be moved up closer to the thrust line. We decided to modify the winning Tardon.

The 1969 Nationals were only days away when the redesigned plane was ready for testing. That first flight [illegible] all, or perhaps even more than, a modeler could desire. The ship handled like a dream, and no trim changes were necessary. The only problem was with the pilot, who has a habit of dancing or shuffling his feet during a test flight. Jack was a nervous wreck, but the Tardon made a perfect three-point deadstick landing on our 240-ft. strip.

This plane is fantastic. It demonstrated its high speed capability by qualifying at the Nats with a hot 2:06. Yet, with the engine killed it glides in for landing like a sailplane. It shows no tendency to fall off on a wing during low speed turns and, with the limited elevator throw, it will not stall.

When flying full-bore, the stability is phenomenal. It flies the pylon course [illegible] though programmed by a computer. One takeoff during the National finals was made totally blind. Jack's mechanic stood up in front of him just as the plane was released. Jack just pulled up and waited until he saw his orange and white bird over the heads of those in front of him.

Tardon II is an easy plane to fly, even for a beginner. Most Class A fliers would have [illegible] trouble handling it. It also can be an attractive aerobatic plane—but fast!

Construction

Construction is somewhat more sophisticated and time-consuming than usual, but it [illegible] not difficult. The end results are well worth the effort. If possible, total weight should be kept under 5 lb.

Tail: The stabilizer is simple to build, with 1/16" sheet balsa covering a Warren truss frame. Note that spruce spars are used and that the leading edge is quite tapered. The center of the bottom sheet is slotted to allow the stabilizer to slip over the sub-fin. When making this assembly, epoxy the joint thoroughly, since quite [illegible] bit of flexing takes place here. However, after [illegible] year of flying, our Tardon's joint has not failed.

The elevators are made from a sheet of ¼" balsa with ¼" plywood joining them. Vertical fin and rudder construction is similar to that of the stabilizer. The direction of grain and type of balsa are most important; choose the wood carefully and keep it light. Be sure to use toothpicks when securing the rudder hinges, particularly the bottom hinge.

Wing: The original Tardon [illegible] had [illegible] foam core wing. Templates [illegible] shown on the plans for either foam or built-up construction. When foam is used, leave out the ⅛ x ¼" wing spars. If the equipment necessary to build foam wings is not available, use the stack method for cutting ribs. Cut [illegible] plywood [illegible] aluminum template of the root rib and the tip rib. Between these add 14 pieces of 1/16" sheet balsa. Tack-glue all these together with Ambroid and, when dry, carve down to the template. Then slip [illegible] razor blade between the ribs to cut the glue joint. Draw the centerline on each rib, as well as a centerline the full length of the ¼ x ⅝" leading edge and ¼ x ¼" trailing edge.

Pin the leading edge to a flat work surface, using ½" blocks under it. Pin the trailing edge to the surface, with 11/16" blocks beneath it. Make sure the centerlines face the ribs. Insert each rib in its proper place and glue with Titebond. Check the alignment of each rib centerline in relation to the leading edge and trailing edge centerlines. Allow this construction to dry overnight. Then add the ¼ x ⅛" wing spars and 1/16" sheet webbing between them. Do not remove the wing from the table until the assembly has dried overnight.

Add hardwood landing gear blocks. Cover each wing panel with 1/16" balsa. Using ⅜" select grade balsa, add the wing trailing edge and ailerons. Install the aileron torque arms and ⅛" brass tubing. Install wing tip blocks. No dihedral bracing as such is used. Simply epoxy a 4" piece of 2-oz. fiberglass cloth around the center of the wing, after blocking the tips up ¾".

After the epoxy has cured, the cutouts for the fuel tank and aileron servo can be made. Give the completed wing a final going-over with sandpaper, then make the cutouts for the landing gear. Remove the ailerons from the wing and add the hinges.

Fuselage: The fuselage sides are cut from 3/32 [illegible] 4 [illegible] 48" balsa. Cut out for the wing but do not cut through to the bottom of the fuselage. This will be done later. Using contact cement, glue the 1/32" sq. plywood and the 3/16" sheet balsa doublers to the sides. Add the ¼" plywood engine mounts, ⅜" triangles, and 3/16" sq. pieces to each side. After both sides have thoroughly dried, pin the bottom of each fuselage side to the plan, starting at the tail. Insert the 3/16" sq. pieces across the fuselage top and bottom.

Now add Former F4 which has been cut from ⅛" plywood. Install the vertical grain portion of the sub-fin at this time, checking alignment carefully. Then pull the nose together and add Formers F2 and F3. This is the best time to add the ⅜" triangle stock between Formers F2, F3 and F4 and the fuselage sides. Glue the 3/16" sheet turtle deck and the ¾" nose block in place.

After drying overnight, the fuselage may be removed from the building board, turned over, and the bottom glued in place. Add enough ⅜" sheet blocking to the nose to allow a good profile after carving and finish off by gluing F1 in place. Round all corners as much as possible and rough-sand.

Cut out fuselage sides for the wing. Glue Former F4A with wing hold-down fitting in place. The fuselage is fitted to the wing, with 1/32" clearance allowed along the top of the wing for the plywood wing saddle. When the wing fits to satisfaction, glue the plywood saddles to the fuselage sides. Hold them in place, with Saran Wrap on top of the wing, until the glue has dried. Next, the cheek cowls are cut and rough-carved. Sand them to approximate shape, hollow out and glue in place. Form the remainder of the wing fillet with Epoxolite putty. Fit the section of fuselage under the wing in place. Glue to the wing,

(Continued on page 76)

Formula II planes with 600 square inches are fairly large. Because of the drag of the larger wing, well-thought-out streamlining is essential. Fuselage profile shows careful designing.

R/C DON LOWE
General Correspondent
SPORT and PATTERN

Proposed Channel Changes: The FCC has proposed changes for the 72-75 mHz ranges so that two of the present spots would be shared with other model users and two [redacted] channels assigned to non-aircraft application. AMA is actively preparing arguments to change this rules proposal. These changes [redacted] suggested because of the recent rapid growth of RC car activity. Many modelers want to use their airplane systems in [redacted] on 72. Others feel it is discriminatory to deny 72 to non-aircraft users. It is—and the reason is safety.

Whatever the outcome, consider that, because of the close-range operation of RC cars and most RC boats, 100 miliwatt transmitters are more than adequate [redacted] any frequency. And with the 27 mHz band, any frequency within the band may be used by a transmitter of less than 100 miliwatts. That means fifty channels or more. We think this band is where all non-aircraft use belongs. Fifty channels for less than 100 miliwatt transmitters is enough.

Careless Frequency Control: In the Crescent City R/C Club's newsletter, "The Flyaway II," Ron Romeo reports "two planes shot out of the air as the result of carelessness with the frequency clothespin. The plane in the air had the pin in both cases, and in both cases the guilty party [redacted] an experienced flyer." Unfortunately, such [redacted] is much too common!

Most clubs have ground rules to prevent simultaneous operation of transmitters on the same frequency. Some use a colored flag [redacted] the transmitter to signify frequency, but, are fliers color-blind or too lazy [redacted] observe what colors are flying? Most clubs use a clothespin system, requiring the acquisition of [redacted] appropriate-colored pin and affixing it to the transmitter prior [redacted] turning it [redacted]. Other clubs impound transmitters, even during regular weekend flying.

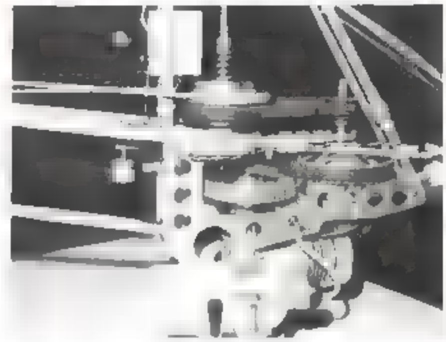
The problem of frequency control will always be with us, human nature being what it is. But if somebody violates [redacted] rules and washes out some hapless flier's hard-won pride and joy, is it enough to say, "Gee, I'm sorry!" Personal and financial responsibility is assumed for the careless wiping out of other kinds of property such as automobiles. Why shouldn't such responsibility extend to models? Obviously, clear-cut operational ground rules and clear evid[redacted] of fault must be established before judgment can be made. What do you think?

Kapiolani RC Club of Honolulu, Hawaii, flies at Diamond Head Crater. Models are mostly high-wingers for off-grass operation.

Selectronics retract gear in a Lanier Citron is unique in many ways. For example, nose gear retracts forward, mains retract outward. Mains are mounted on plywood base without spar support. Flies great.

Here [redacted] several suggested operational ground rules. (1) Never operate a transmitter without a frequency flag. Write frequency numbers [redacted] flag to prevent color confusion. (2) Use [redacted] frequency and color-coded clothespins. (3) Impound transmitters with antennas removed. (4) Require fliers to operate from a designated area so that [redacted] is easy to see who is flying and to check his frequency. This also prevents fliers from being clobbered by aircraft taking off and landing. (5) As an added precaution, always turn the receiver [redacted] first and note its operation,

(Continued on page 68)



Ernie Huber, who is a machinist, has taken up the helicopter challenge. Nice work.

R/C FRED MARKS
Specialist Correspondent
TECHNICAL ITEMS
AERODYNAMICS

A Digital Addition: An auxiliary function for digital equipment can [redacted] added to existing radios inexpensively and simply. Its application can [redacted] to throttle, flaps, landing gear or other auxiliary functions. Furthermore, it requires omission of the digital information for only about half [redacted] second, just enough [redacted] start it [redacted] its way [redacted] the next position. During this half-second, the regular digital servos stop for an unnoticeable moment.

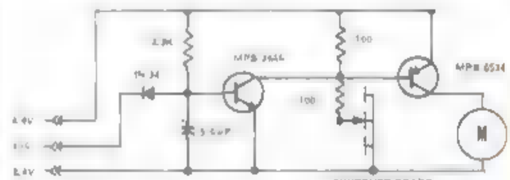
[redacted] S-4 Controlaire servomechanism with [redacted] small switcher board, designed by Ken's RC, is used in place of the normal feedback potentiometer. [redacted] two-transistor POD is used [redacted] control the [redacted].

The schematic shown is for a negative-going input signal. From this figure it can be [redacted] that the input pulse (taken from a servo signal lead or at any convenient and compatible point on the digital decoder) is coupled via a steering diode to the 5.6 mf capacitor. As long as pulses are present, the first stage transistor is biased off by the 100 ohm resistor to its emitter. Upon omission of the pulses, the first transistor is biased [redacted] via the 2.2K resistor and, in turn, drives the output transistor into full condition.

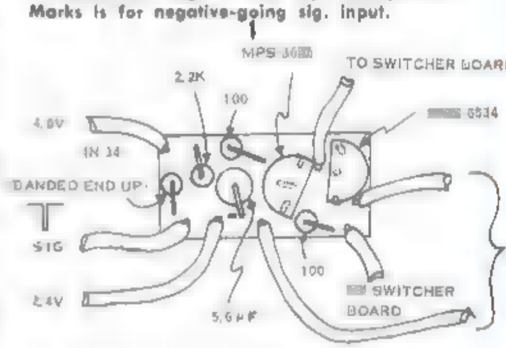
As soon as the servo starts to move, the potentiometer wiper (normally used for feedback in the digital-type application) makes contact across the switcher plate. The plate is mounted where the pot element is normally located. This retains bias [redacted] the output transistor to full conduction, even after the pulse train resumes, until the switch plate contact breaks. The plate shown is for three positions to [redacted] used for throttle. If it is to be used for [redacted] two-position function, e.g., landing gear, the area of the switcher arc identified by a black dot should be blocked out prior to making a photo-etched [redacted]. c. board.

The POD can be used with a positive-going input pulse by simply making the mirror-image [redacted]. c. board and using MPS 3638A and MPS 6531 transistors in place of the MPS 3646 and MPS 6534, respectively. All other component values are the same.

The unit built and tested was used with



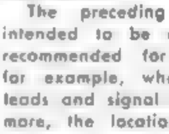
Schematic for digital POD by correspondent Marks is for negative-going sig. input.

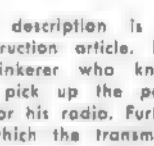


[redacted] board layout is simple, and with so few parts, assembly is easy.

the Controlaire Digit Migit single-function digital system and works happily with other negative-going pulse digital sets. Both positive and negative pulse are available on the Digit Migit. Its installation will be described next month.

The preceding brief description is not intended to be a construction article. It is recommended for the tinkerer who knows, for example, where to pick up the power leads and signal leads for his radio. Furthermore, the location [redacted] which the transmitted pulse train can be interrupted within the transmitter using a normally-closed push-button must be known. In most cases, however, [redacted] duplicate servo plug on any channel provides the signal and power lead [redacted]. The "enable" button on current digital radios for operation of buddy box or instructor/trainer system performs the pulse-stopping function at the transmitter.





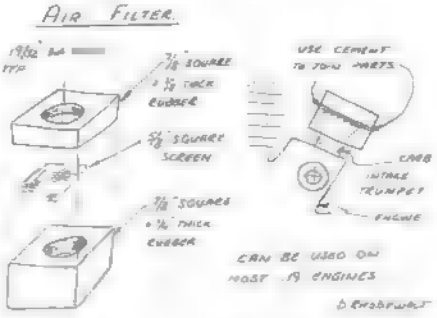
R/C GEORGE SIPOSS
Specialist Correspondent
R/C CAR RACING

Tires: The latest fad in tires is spongies. Since some sponge tires behave better than others, the best types are semihard closed cell neoprene rubber. They are responsible for an approximately 10% decrease in lap times and for more control. . . .

Engines: The most popular engine is still the Veco 19. An air cleaner must be used on the carburetor intake (see diagram), as well as a fuel filter. The latest fad is to machine off the cylinder head fins so that a flat aluminum plate can be mounted with the six head screws. Machined "velocity stacks" can be attached for a more authentic look. Such an item is available from Dynamic and fits most 19's. . . .

Gas Tank: The tank should be mounted so that when it is half full the fuel level is about even with the needle valve on the carb. . . .

Japanese Jeep is for fun, not racing! Has differential, throttle, brakes, etc.



Amazing how much dirt gets into an engine. Simple filter eliminates problem.

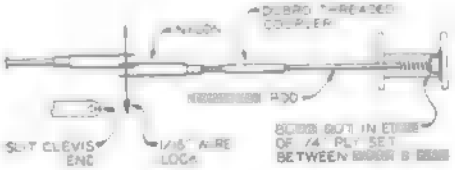
New Clubs Forming: Contact the nearest club. In the Philadelphia area, write Larry Robbins, P.O. Box 37, Warminster, Pa. 18974; in the Bay area, Ray Bell, 1082 Cascade Dr., Sunnyvale, Calif. 94087. . . .

Shop Hints on Filters: Don Rhodewalt makes a filter from a large piece of soft rubber, such as a pink pearl eraser, and a filter screen of fine wire mesh (use screen from a faucet strainer). Cut out the rubber blocks so that the hole is equal in size to the neck of the carburetor. This way it will have to be stretched over the trumpet (intake opening).

In a pinch, a fuel filter can be made as follows: From a very fine mesh wire screen, cut out a 1/4 x 1/2" rectangle (experiment with size to find one best suited to the fuel line). Roll this rectangle into a small-diameter cylinder, one-half inch long, and tuck it into the fuel line near the carburetor. Take it out occasionally, it's surprising how much dirt it catches during a typical race day. If the rolled-up screen is too loose to be effective, bend the screen in its center so that it will cock in the line.

R/C HOWARD McENTEE
Specialist Correspondent
GLIDERS and FAI

Useful Wing-Attach Method: An arrangement utilized by Harley Michaelis to hold the wings on one of his large soarers worked, but he felt it wasn't practical. It was too difficult to run the 1/16" dia. lock wire through to the clevis ends, back in the dark area of the fuselage. However, with a few modifications to the installation, the idea became quite practical (see sketch). Guides inside the fuselage ensure proper wire placement. A slit end allows the clevis to pull loose in a bad landing or crash. This may ruin a clevis, but a new one is easily installed. . . .



Wing attachment method by Michaelis allows impact release but easy assembly.

Wilhelm and Willoughby hold Flying Cucumber and Kurwi 68 Universal prototype.

Father of the Kurwi: Dale Willoughby, during a trip to Germany, visited Kurt Wilhelm, who designs and kits the Kurwi gliders. Wilhelm's Flying Cucumber has an odd fuselage shape and was built to test a V-tail installation on the same sort of glider. Although he has a complete woodworking shop in the basement, Wilhelm does much of the kitting work, including fiberglass fuselage manufacture, in his apartment. He uses epoxy for fuselage work. A lifetime model plane builder, Kurt seldom has time for flying any more, what with a full-time job and the great demand for Kurwi kits. . . .

Computerized Scoring: Pencil and paper toil by dedicated modelers' wives (or girlfriends) may come to an end, if more clubs follow lead of the League of Silent Flight. For their August Soaring Tournament at Livermore,

(Continued on page 66)

Beautiful rocket-firing AM-1 Mauler by Bud Nosen. Fires individually all at once.

R/C CLAUDE McCULLOUGH
Specialist Correspondent
SCALE

Swoosh: Bud Nosen's Marine Mauler took first at the Des Moines Modelaires Pylon and Scale Contest June 27-28 with a demonstration of operating rockets. Contestants and spectators found the realism perfect—puffs of smoke at ignition, followed by a salvo streaking away.

Unlike some earlier attempts with fireworks, Nosen's installation is well-tested, uses the safe and proved standard solid fuel model motors. To make certain that the rockets cannot be accidently launched while handling, a thin music wire lock is strung through holes in the mounting tubing and dowels. A long ribbon on the end acts as a reminder, just as in full-scale practice, to arm the weapons before takeoff. An interlock on the transmitter auxiliary level to prevent inadvertent triggering would be a good addition. The rockets go where they are pointed and a dive attack puts them right on target.

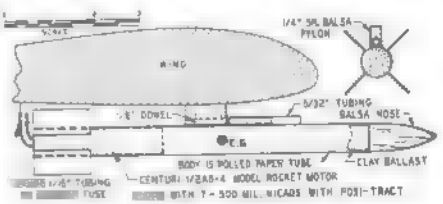
Bud is adding a further feature on his Nationals entry P-47. Charges of flour will replace most of the clay ballast to simulate an explosion on impact. . . .

Bigger Is Better: There seems to be a trend to smaller RC scales with higher wing loadings. Details, external stores and thick paint jobs are crammed aboard as though control lines were going to be used. Given precise digital control, ample power and high pilot skill, it is sometimes possible to make a lead sled fly. More often the result—if it lasts through the test flights—is a jumpy bomb, a snap roll looking for a place to happen. Building to a larger size will tame such tendencies. The major advantage is reduced scale effect. A six-ft. span shows markedly better flight and handling characteristics over the same subject at five ft., even at identical loadings.

Robin Lehman's 1/7th size Britten-Norman Islander twin has been described in previous issues. Now he has produced a larger 1/5th version of the same design and is in a unique position to make comparisons. The weight went from 11 lb. to 19, but the wing loading dropped by 40%. The big job flies so well that it is hard to tell when an

(Continued on page 68)

Rockets fired by Mauler, above, are made of paper and balsa. Commercial motor used.



C/L BILL BOSS
General Correspondent
SPORT and SCALE

Slo-Moe: This all-purpose plane was designed by Bob Sylvia, for use in slow combat, balloon busting, and as a stunt trainer. With a little extra work on the control system and an engine change, it also could be used in the Profile Carrier event. The plane has been flown by Bob and several of his fellow club members (Suffolk Wings, Long Island, N.Y.) since 1966. An excellent flyer, it has garnered many awards in slow combat and balloon busting at local contests. It even has been successful against the fast combat jobs.

Bob's plane features two innovations: a diamond-shaped airfoil and a two-piece fuselage. Both of these make for easy construction and great strength at the wing-fuselage joint. In addition, the plane can be built with standard sizes of balsa. The list of materials is simple: leading edge, 1/2" sq.; two wing spars, 3/16 x 3/8"; trailing edge, 1/16 x 1 1/2" sheet; tail assembly, wing ribs, and wing tips, 1/8" sheet; 3/32" plywood doublers; and a 3/8" or 1/2" plank for the fuselage; 1/16" sheeting for center wing planking. Miscellaneous items for landing gear, control system, hardwood engine mounts, plywood bellcrank mount, etc., also are required.

The diamond-shaped ribs (12 required), because of their long flat bottoms, can be pinned to any smooth flat surface. Therefore, alignment of all ribs, spars, etc., is easy. Space the two center ribs in relation to the fuselage thickness, since the fuselage halves must fit in properly between them.

After the wing is constructed, cut out fuselage halves and notch both halves at the proper locations to accept the wing's leading and trailing edges, and top and bottom wing spars. Cut the nose of the fuselage to size for the chosen engine (19 to 35).

Next, cement fuselage halves into place between the two center wing ribs. Install doublers and engine mounts. Cut out and install rudder, stabilizer and elevator assemblies. Install bellcrank mount (1/8" plywood) in inboard wing sections. Landing gear, outboard wing weight, and tail skid complete the basic construction. Sand, cover and paint.

The Slow-Moe has great stability, maneuvers well, and will take rugged handling from the novice. In the hands of the experienced flier, it gives an excellent performance.

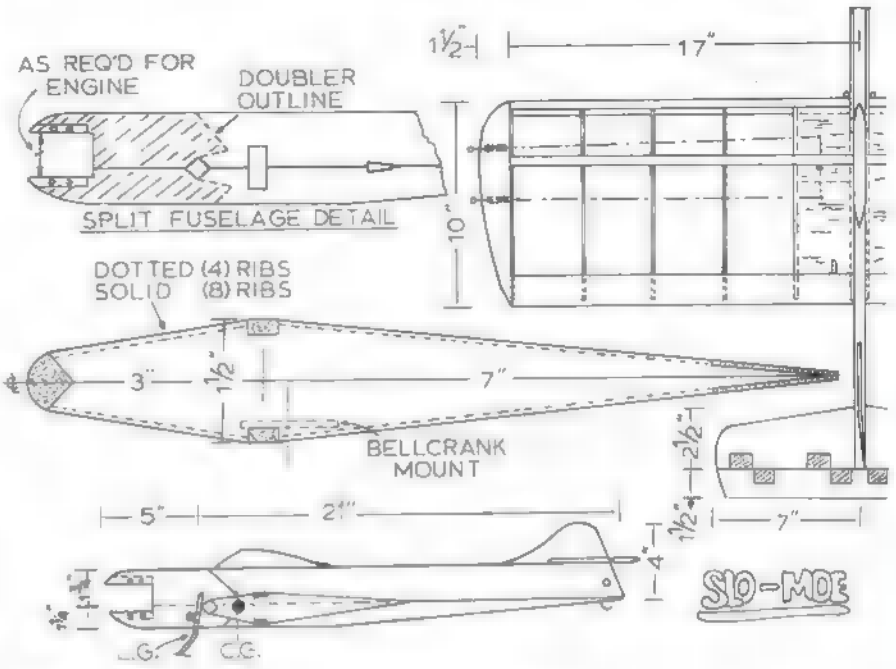
Bob will provide detailed construction drawings to those that want them. Write Bill Boss, care of AAM. . . .

Pacifier-Type Fuel Tanks: This item appeared in "Modeling's Liveliest Monthly Fishwrapper" (newsletter of the San Jose Aero Modelers). Marv Wentz, Technical Editor, describes the simple construction technique. Secure some gum rubber baby pacifiers and pull out the plastic ring and insert. Discard these parts. Next, cut some short lengths of 1/8" brass tubing, about 1/2" to 3/4" long. Insert the brass tubing into a length of black Veco fuel tubing which will reach from the spray bar of the engine to wherever the tank outlet is to be located on the particular plane. Insert the brass-tubed end of the fuel tubing into the pacifier and bind off securely with a small rubber band. That's all there is to it. Make up several of them because they don't last forever. The big advantage of this type of fuel system over the usual metal-tank type is that the pacifier-type provides a more positive fuel flow, no matter what position the plane may assume during flight. . . .

Salute to Middlesex: Middlesex Modelers Inc. (Middlesex, N.J.) has 42 members, three of whom are girls and, with 21 adults and 21 Juniors, there's no lack of Junior participation here. The club maintains a minimum of four training ships for use by newcomers and those that can't afford a plane. On top of this, it pays all AMA membership fees for Junior club members.

Promotional activities of the Middlesex organization include static displays, club movies, and flying demonstrations for local orphanages, Boy Scouts, Lions and Jaycees. This civic interest has put them in a favorable position with local townfolk and has enabled the club to obtain a flying site that now has three 60-ft. circles, two of which have blacktop doughnuts. Two smaller circles are for 049-type flying.

Those who wonder how to promote a club, obtain flying sites, or encourage junior membership, might take note of how it has been done by the Middlesex Club—hard work, well-organized promotional activities, and some special attention to the newcomer. To the Middlesex Modelers, "Thanks for a job well done."



Bob Silva's all-purpose Slo-Moe is about easy to build as any 19- to 35-engined plane. plane. Diamond airfoil builds on flat board. For larger drawings write AAM.

U.S.S. Middlesex is pride of N. J. club. Group has excellent community relations.

C/L JOHN BLUM
Specialist Correspondent
CARRIER and STUNT

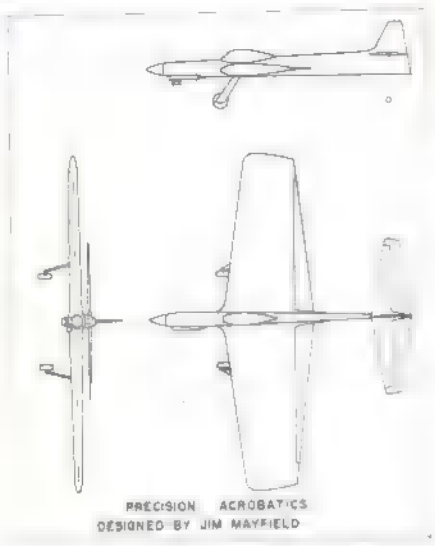
Stunt or Precision Acrobatics: This column has provoked a welcome response from modelers who have flown aerobatic models. It is always surprising that so many build great stunt models, yet are not interested in competition. However, reasons for this attitude are not hard to understand! Rules changes are only part of the solution. By presenting ideas and theories received from all levels of interest, we hope to spark concern and reaction toward bettering the event.

By this time, a rules change may have eliminated appearance points. Al Sugar comments that "in the Chicago area, the appearance of the ship is the only determining factor." He and four other stunt flyers will not participate in the event until it is run under FAI Stunt rules.

Bill Noyes, in the SCCA Newsletter, suggests that all Southern California contests go straight FAI rules in Stunt. Certain elements in the St. Louis area promote the same philosophy. It's your event; consequently, it'll be what you make it. . . .

California Stunt Model: Jim Mayfield's new stunt model incorporates ideas evolved from his wide experience. It also meets coming muffler requirements—thus the exposed engine head and muffler, since muffled engines run somewhat hotter.

Other design characteristics, based on careful observation of what produces a winning combination of appearance and flyability, are: (1) swept-back rudders, which make inside corners appear round, while vertical rudders combined with straight fuselage make corners appear square; (2) the placement of the bubble canopy, which creates the illusion of the plane's pivoting around corners; (3) the straight fuselage, which emphasizes the straight sides of square maneuvers and level flight; and (4) a color scheme



Mayfield's new stunter is designed for mufflers and maneuver-appearance effects.

which adds to appearance in flight.

Jim feels the future trend in stunt design will be away from the jet look and toward a more functional design. He cites Bob Gleske's Nobler as an example. The model shown will be powered by a Fox 35 with muffler. Its weight of approximately 43 oz. is good for the 52-in. span at 560 sq. in. . . .

Keeping The Lines Tight: William Watkins handles the problem of slack lines during periods of takeoff and flight by use of a spring-loaded bellcrank. The bellcrank mounting platform usually is located between two wing ribs, with a pushrod to the elevator for up and down control. The slotted platform allows the bellcrank bolt to slide within the opening. The curved slot in the bellcrank permits a guide bolt to maintain horizontal alignment of the bellcrank in operation. This bolt also slides within the platform slot.

Also mounted to the platform is an auxiliary crank from which a pushrod is affixed to the rudder. When the model is at launching position, the spring causes the bellcrank to move toward the outboard wing, thus activating the auxiliary crank and creating offset in the rudder. As the model reaches maximum speed, thus creating centrifugal force increase, the model moves away from the pilot, extending the spring and allowing the rudder to return to a neutral position. An alternate position of the auxiliary crank is indicated and makes reference to high-speed and slow-speed for clarity. This concept could be adapted to Navy Carrier with a few modifications. . . .

Save Those Bottles: Ed Jacobs, quoted in the Aero Modelers (San Jose, Calif.) Newsletter, keeps old dope bottles for other uses. To clean them, he fills the bottles with water and leaves them overnight. When the water is removed, the dope can be wiped out easily. . . .

About That Noise: Jim Mayfield's design indicates thought given to the acceptance of mufflers, which will be required in FAI Stunt in 1971. Various U.S. clubs now are conducting muffler studies. To review the matter, read William Netzeband's article, "Quiet Down or Quit," in the Jan/Feb. 1965 **American Modeler**. . . .

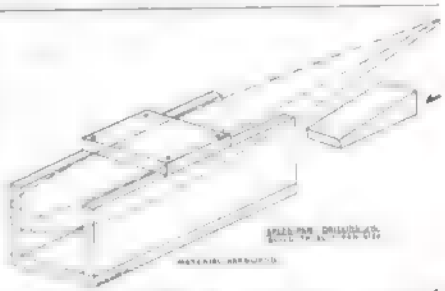
Reference Library: Control Line aerodynamics made painless in the following issues: July/Aug. 1966; Sept./Oct. 1966; and Dec. 1967.

Ray Willman adjusts throttle on Class II Rossi-powered carrier model, a Guardian.

Profile Mustang about to start official flight. From Sterling kit, has Veco engine.

Novi built by Ed Probaska from magazine plans. Weighs 52 oz., powered by Veco 35.

C/L JOHN SMITH
Specialist Correspondent
SPEED and RACING



Engine mount holes in speed pans are tough to align. Try Smith's handy jig.

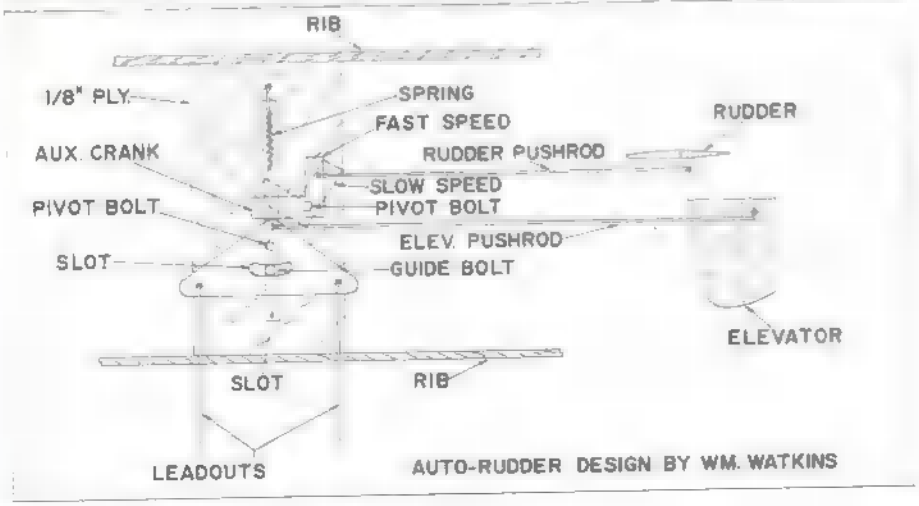
Junior Speed Event: For those who have a problem getting junior fliers to enter contests (and who doesn't?), here is an event that will bring them out in droves. This particular event was initiated in Cleveland and has been flown there for as long as I can remember. It was the brainstorm of Chuck Tracey, Aviation Editor of the Cleveland Press and perennial model aviation leader in that city.

The event requires a minimum number of officials. The only equipment used, other than several stopwatches and a speed chart, is a pylon structure, painted red, white, and blue. A painted pole could be used but the pylon adds a little class to the event.

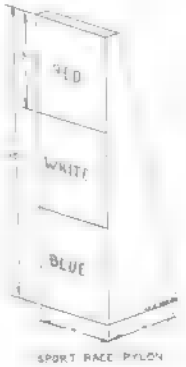
Here are the rules: (1) Any kind of model may be entered, including plastic RTF's, but no speed models. (2) Highest score from one flight is winner. (3) Select any one of three color zones before takeoff and advise judges. (4) When ready, signal for timers to start timing. (5) Hold model at required altitude (color zone) for required number of laps. (6) The number of laps is determined by

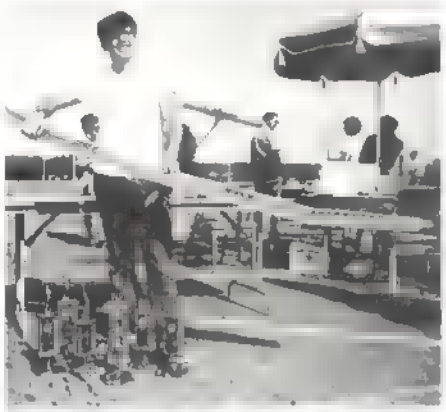
(Continued on page 66)

Why not control rudder position as a function of line pull/airspeed? Watkins simply spring loads his elevator bellcrank and links the resulting motion to the rudder.



Add fun and a challenge to racing events with this colorful pylon. Text tells how.



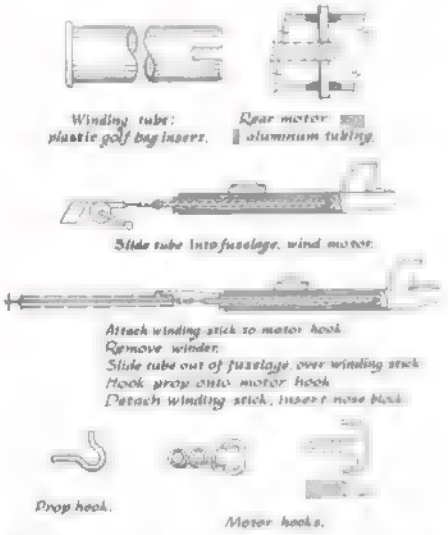


Marty Thompson won Design Craftsmanship award at Boeing contest with this Nordic.

F/F BOB MEUSER
General Correspondent
SPORT

Big Boeing Bash: Fifteen-year-old Richard Stronen of Seattle won the $1500 college scholarship award as grand prize in the Boeing Management Association contest held near Seattle on June 20-21. He took first place in Towline Glider, Cargo, and Indoor Hand Launched Glider, second in Outdoor Hand Launched Glider, third in Indoor Easy B. Bill Fisher, a CL man from Tacoma, and free-flighter Marty Thompson of Livermore, Calif., were close on his heels. The meet included RC and Rocket events in addition to FF, Indoor, and CL, and also a special award for Design Craftsmanship. Flying facilities were excellent, weather superb. Fifty-nine contestants, aged nine to eighteen, came from six states and Canada to participate in the 17 events. Contestants said it was an especially well-organized and well-run meet. Boeing was delighted, plans a repeat in 1971. . . .

Blast-Proof Rubber-Powered Models: Enough energy is stored in the rubber motor of a big Unlimited Rubber model to lift an automobile three inches. When that motor explodes during winding, as it surely will sometime, weeks of effort are destroyed, along with a possible trophy or national record. Bob Stalick (AAM, June 1970, page 38) showed how the motor can be inserted into the fuselage after the motor is wound. A variation on this theme (see drawing) employs a winding-tube inserted into the fuselage during winding. This system saved Andy Faykun's Unlim at a recent meet, and George Xanakis uses a similar arrangement with his Wakefields. The plastic tubes used in golf bags, available at sporting goods stores, are 1⅛ in. diam., 34 in. long, and are ideal for large models. A cardboard tube taped liberally with electrical tape is fine for smaller models. The prop must be detachable from the front motor hook, and the hook must have a place for the winding stick to hold it while it is being transferred from winder to prop. Sounds complicated? Not really, and much less so than building a new fuselage! . . .



Meuser suggests plastic golf bag insert as fuselage protector for rubber jobs.

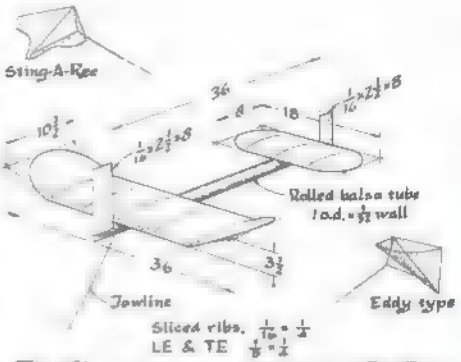
A clear demonstration (in Meuser's model) of what happens when the motor explodes.

Kites are Free-Flight? What is a towline glider on tow if it isn't a kite? Mostly-indoor-builder Bill Bigge builds kites that are a cross between indoor microfilm model and an outdoor rubber-powered job. Much can be learned about free-flight from kite flying, and Bill has demonstrated that being a free-flighter puts him one-up on the traditional kite fliers. Bill won the Best Kite Award at the Smithsonian Institution's annual Kite Carnival in 1967, 1968, and 1969, and this year won an award for Best Airplane-Type Kite.

Originator of the Carnivals was Paul Garber, recently retired from a lifetime with the Smithsonian aviation museum. Paul developed camera-toting kites for the Army in World War II and some oldsters will remember his book, **Building and Flying Model Aircraft** of 1928 at about the end of the twin-pusher era.

Washington, D.C., area is a hotbed of kite-flying activity, with contests sponsored by the Maryland Kite Society, the National Park Service, a group at the University of Maryland, and the D.C. Maxecuters, in addition to the Smithsonian. Someone must have reasoned that if kite flying is darned much fun there must be a law against it. Sure enough, they dug back 80 years and found one, and for a time the police were actually busting people for the criminal and vile act of kite flying!

Bigge's latest endeavor features lightweight indoor-model-type construction and a forward fin—conducive to stability, as pointed out in J. K. Querman's article in the **1957-58 Model Aeronautic Yearbook** (Frank Zaic, Model Aeronautic Publications). Its predecessor was a similar tandem-wing affair which began life as an Outdoor Unlimited Rubber class model but which, according to Bill, "was much happier as a kite."



The Cleaver, championship kite by Bill Bigge

For very light kites, Bill uses nylon thread unraveled from model-covering cloth—about 5-oz. strength, wound on a 2-in. spool attached to a 16-to-1 gear ratio rubber winder—reels them in fast. One of Bill's kites of the conventional crossed-stick Eddy type has wires at the center of the horizontal stick which permit the sides to fold back harmlessly when the wind becomes too strong, or when reeling in rapidly.

Flying scale kites are an intriguing idea. A free-wheeling prop could act as a forward fin to provide the required stability. Bill tells about flying kites into thermals! It seems a fellow could learn much about thermals—size, strength, etc. — by towing a kite back and forth through them. If the flying-site problem continues to intensify, maybe we'll be forced to adopt kites. Bill says one of the best store-bought kites is the one-dollar Sting-A-Ree by Gayla Industries.

Bill really wasn't up to par at his most recent kite contest — seems he was up late last night before finishing his model dirigible! . . .

Canceled Because Of — Sheep Ticks?: We have heard of meets being canceled because of rain, snow, wind, and war, but sheep ticks is a new one. Ocie Randall says that, since several of their members had lost a week's work and one was hospitalized for three days after being bitten by the wee beasties, the Fresno Gas Model Club has ceased holding meets in April — no problem in March or May. That this is no small matter is emphasized by what the Fresno group will put up with without canceling a meet. At their June meet the wind was so strong that more than half of the entries were lost with three-minute maxes. Most were later found by airplane search. W. F. Morgan's model was wrenched around by the wind, and the prop of his Tiger 15 chopped up his hand so severely that stitches were required. Then, after the meet, the headquarters trailer was literally blown off the road while being towed home and totally destroyed, along with stopwatches, PA system, and records. Oh well, everybody has their little problems.

F/F BOB STALICK
Specialist Correspondent
GLIDER and RUBBER

Community Model Airplane Program: The lifeblood of this hobby is based not only on continued participation by old hands, but also on the developing of new modelers

Twins Reid and Roger Simpson, members of U.S. Air Force Team, seen at '63 Nats.

to share in the wonders of flight. So many of the technicalities taken for granted by experienced fliers are completely bewildering to a newcomer. Older beginners can turn to a number of sources for information, but the young ones are left pretty much in the dark unless a modeling [illegible] neighbor is willing to spend hours explaining the intricacies.

Working with rank beginners in the small-fry category is a trying and time-consuming, but rewarding, endeavor. Those who have tried a model building and flying program for youngsters know what I [illegible]. Until Frank Ehling developed the AMA Racer/AMA Sig Cub, building a truly flying model too often [illegible] beyond the ability of the beginner. Now, based [illegible] the AMA Sig Cub, the AMA has published a booklet, "A Community Model Airplane Program," which details methods for establishing a program for young beginners.

For [illegible] past two years, members [illegible] the Willamette Modelers Club, Inc., have sponsored such a program at the local Boys' Club. A long-term project which lasted 20 weeks, it attracted and introduced about 60 youngsters to the wonderful world of model airplanes. The program went on, in 1969, to prepare members for competition in the AMA-HIAA-Navy Air Youth Program. This year the Willamette Club hosted its own meet, open to anyone under 16.

Much was learned by applying basic aeromodeling experience to basic aircraft and by planning a program well in advance to prevent anticipated difficulties. Club members also learned some important things about working with groups of youngsters. For a successful program, the following suggestions [illegible] invaluable:

(1) If the program goes beyond the Sig Cub phase, and it should, have a limited number of modelers for each instructor. Six or eight boys asking questions and wanting help for an hour and a half is about the limit of human endurance.

(2) Schedule meetings regularly and at the [illegible] location each week.

(3) Provide for some type of competition after each phase of construction. For example, when the Sig Cub is finished, hold [illegible] informal contest to teach adjustment and other flying techniques pertinent at this level.

(4) Have some long-term goals, such [illegible] the AMA-HIAA-Navy Program was in 1969, to culminate the year's activities.

(5) Enroll only youngsters who can display [illegible] least basic reading skills. We also stipulate that boys be eight years old, but prefer them a year [illegible] two older. Requiring a small investment of 50 cents or a dollar by the youngster helps ensure his taking care of the equipment and supplies.

(6) Require that all building for the program take place at the meeting site. However, encourage youngsters to try constructing other models [illegible] their own. Suggest [illegible] that are equal [illegible] their current building level.

(7) Have a beginners' ten week session and then an advanced section for those who successfully complete the beginners' phase.

Next month, a week-by-week outline for setting up such a program will be given.

Jack McGillivary of Canada winds while John Foley strains to hold the model.

F/F BUD TENNY
Specialist Correspondent
INDOOR

New York Club Checks In: The Pan American Model Aero Club has 26 active members, all employees of Pan American Airways. The club meets monthly and is adding indoor flying to their regular CL and RC activity. The emphasis is heavy on Indoor Scale, because of drafty conditions [illegible] hangars where they fly. However, the club co-sponsors two indoor meets annually, at locations where flying conditions permit other events. For more club information, [illegible]ite Don Wansor, 514 Beach 45 St., Far Rockaway, N.Y. 11691. . .

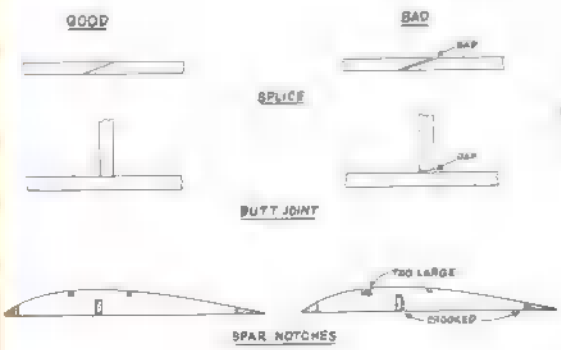
Balsa Wood Joints: A recurring question about indoor models is how to make strong, light joints in balsa wood. Two basic principles are involved: proper fit between the pieces and proper choice of glue. Proper fit [illegible] that the two pieces of wood must touch all along [illegible] joint, with no open spaces left to fill up with glue (see sketch). Glue which fills the cracks adds weight out of proportion to the [illegible] strength.

Almost any commercial model or house-[illegible] cement (except special plastic cements) is good for balsa; however, it must [illegible] slow-drying. Joints in wood get their strength from glue which soaks deep into the fibers and holds them all together. Fast-drying glue hardens without penetrating, thus only the top surface of the wood is involved in the joint.

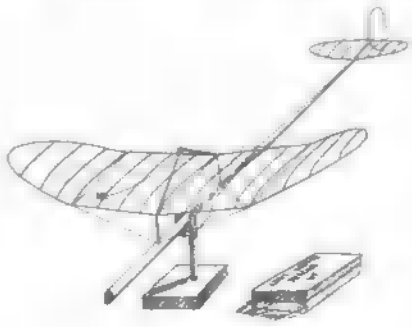
For ultralight indoor models, so little glue is needed that it is made very thin and applied with a hypodermic needle [illegible] control the amount applied. Use dope thinner with a little amyl acetate added to thin out the glue; then experiment with scraps of balsa to get the right mixture for proper drying speed. The same material can be used on heavier models. A small, pointed brush is used to apply the glue. Coat the parts before joining, set them in place and let the first coat dry. Add several more coats of the thin glue. This makes stronger joints with less weight.

Let's have [illegible] club information. Write [illegible] Tenny, Box 545, Richardson, Tex. 75080

Light indoor model joints use the least glue but must have perfect joints as shown.



Sketch by Pat Percival shows proper wire bracing [illegible] indoor microfilm "flimsie."



Don Domino, a strong Paper Stick competitor, watches his model climb for altitude.

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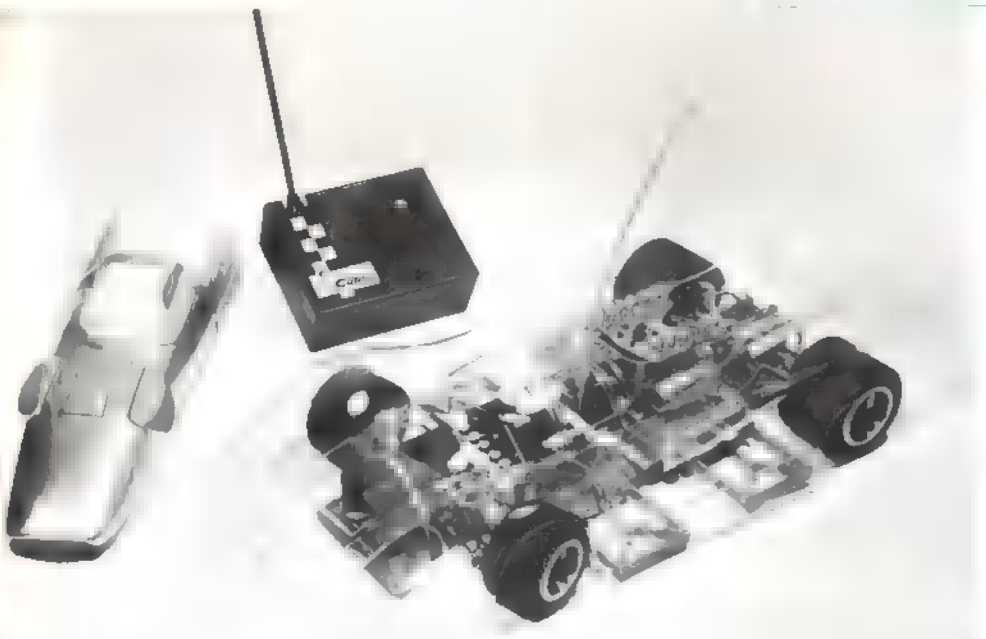


Small Orbit transmitter requires practice to appreciate wheel steering, left-hand throttle and shift controls. Several bodies are available for Dynamic's car.

Orbit "Cobra" with Dynamic Porsche 917

GEORGE SIPOSS

BACK IN THE EARLY DAYS of radio control, Orbit Electronics, with Bob Dunham at the helm, was one of the pioneers. Reed or digital proportional, those black transmitters could be found in the hands of many early RC pilots.

In response to the terrific upsurge in RC car activity Orbit again has pioneered, this time with a set designed specially for cars and with features that reflect an in-depth understanding of human engineering. It is aptly called the Cobra. (Remember the world-beater Cobra-Shelby race cars a few years ago?) Its concept was influenced by the MATS and Toledo shows, where the number of cars convinced even skeptics that a new era in racing has arrived.

Our Cobra was one of the early production models, complete in every respect but not supplied in a fancy box. It was installed in a Dynamic ⅛ scale car, the battery fully charged overnight, and then tested on one of Southern California's popular tracks. The system's frequency was 27.045 (red). This is of no real consequence because the set comes with a set of four spare crystals, and the transmitting frequency can be changed by simply unplugging and replacing the crystals. Thus, during a typical race, a car can be assured of a spot in the starting lineup instead of being "married" to a frequency. A full set of flags is available, so that the set can be completely changed over and complying with regulations in a matter of seconds.

Our transmitter is black with a checkered design and has no unnecessary embellishments. This no-nonsense design is meant to take abuse during a hard-fought race day. The transmitter has a meter, and the on-off switch is out of the way where it cannot be tripped accidentally. The three-spoke design steering wheel is much easier for beginners to learn to use. The wheel allows more feel and resolution than a gimbaled stick. Steering trim is electromechanical and is in an easy-to-reach location above the wheel.

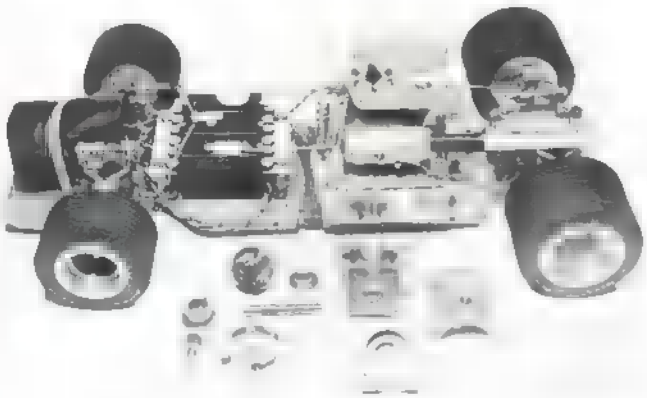
The left hand holds (actually cradles) the transmitter and, thus, the left index finger finds the spring-loaded throttle lever very easily. Below the throttle is another lever, used for cars which have a shiftable gearbox or torque converter. The center position of this lever has a spring detent to locate neutral.

Located in a slanted position on the upper edge of the transmitter, the antenna is automatically in a vertical position when the transmitter is held most conveniently. This assures maximum power output and is not a hazard to nearby drivers who stand elbow to elbow while racing.

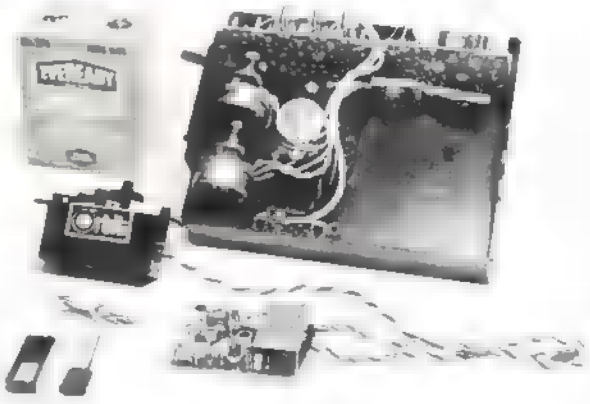
The layout inside the transmitter is uncluttered, the PC board sits neatly

(Continued on page 76)

Torque converter has effect of infinitely variable gear ratios from infinity (which is out of gear) to 6.6 to 1, fully engaged. Declutching in a spin takes practice; you must be quick. Drag race starts are nifty; one can lay a strip of rubber spinning the tires. Akerman steering system is fully adjustable.



In addition to all-plastic transmitter, two most significant features of this radio are interchangeable crystals shown at left—an essential feature for serious racing. Another feature is super-fast FS-5 servo with very thick gears, as shown. Incidentally, while NiCads are used with receiver, the dry transmitter battery seemingly lasts forever.



An RAF Boston III in Egypt in 1943. Photo fortunately reveals the twin swivel-mounted guns in [illegible] cockpit, gun pod on side of nose.

HAVOC

Douglas A-20 saw widespread service in many roles throughout World War II

DON [illegible]

Photos by Howard Levy

MORE THAN SEVEN THOUSAND were built, yet it doesn't stand out as one of the major types in the history of military aviation. Produced as both a bomber and [illegible] fighter, it entered service before Pearl Harbor and remained operational to the end of the Second World War. Yet few, aside from those who flew the Douglas A-20 or one of its many variations, remember the type as anything more than a familiar light twin that did many jobs well, but never did anything really spectacular.

Perhaps because of its origins the Havoc or Boston, or whatever you want to call it, is something of an under-appreciated airplane. It began as the Douglas Model 7A, [illegible] company project intended to be the U.S. Army Air Corps' first twin-engined attack bomber. The original 7A never was completed, but the 7B flew for the first time late in 1938, at more than 300 mph—quite a speed for bombers in those days. It was not only fast, but it also was unusually well-armed, with eight .30-cal. machine guns in the [illegible] version and an additional four in the solid nose of the A version.

While the airplane looked highly promising to the USAAC, the first orders came from the French who contracted for 380, highly modified in light of what had been learned in the Spanish Civil War. Known as the DB-7, fewer than half of those ordered were delivered to France before that country fell to the Germans, and hardly any of those planes got into action. By a variety of routes, a large number of them came to the Royal Air Force, where they were pressed into service [illegible] trainers, bombers and fighters, including some of the first radar-equipped night fighters.

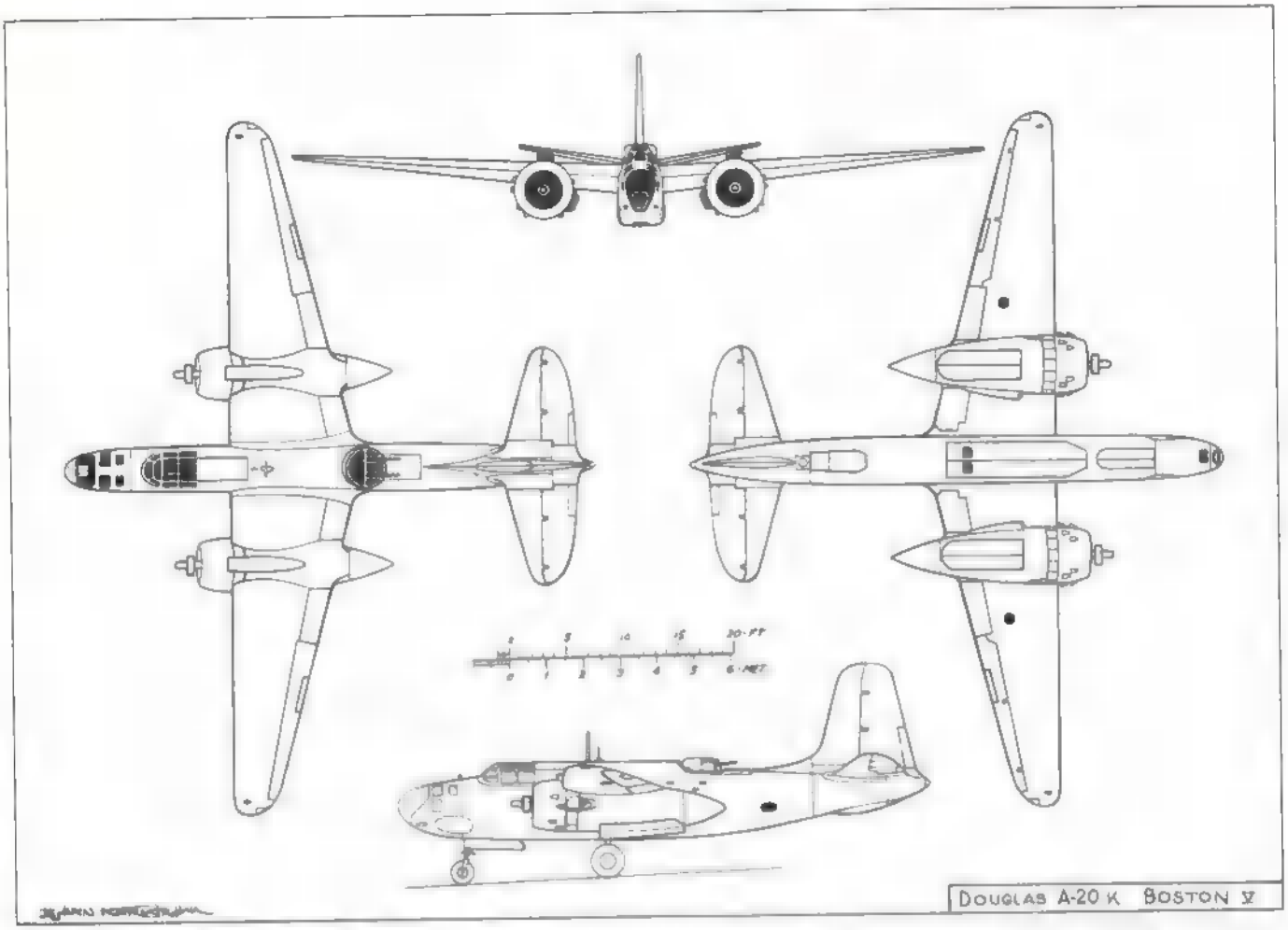
Because of the desperate need for night fighters to hold off the German He-111s, Ju-88s and Do-217s, the British tried [illegible] novel ideas, including trailing a bomb [illegible] a 2000-foot cable behind the Pandora version of the Havoc I, in hopes of dragging it into low-flying bombers. A more practical idea was the Turbinlite, a monster searchlight grafted [illegible] the nose of a Havoc [illegible] Boston, in place of the far more graceful solid or clear nose. The intention was to light up enemy aircraft so that they could then be shot down by single-engined fighters. Before the system was fully developed—if, indeed, it ever could have been—airborne intercept radar came into being and the bulky light was replaced by strange collections of antennas.

All the while the British were enthusiastically using the trim Douglas fighter/bomber, the U.S. was moving ahead with its plans. The first A-20A's were ordered in July 1939, and deliveries commenced in 1940. By 1941, as the war in Europe gained intensity and U.S. entry neared, orders for the machine poured in from not only the USAAF and the RAF, but also from European governments-in-exile who were fighting from British bases.

As the airplane saw more action, it was continually modified. Armament was increased, as was the bomb load. To handle the rapidly increasing weight, the original Pratt & Whitney R-1830 Twin Wasp engines of some 1100 hp. were replaced by Wright R-2600 Cyclones of 1600 hp. Early problems with directional stability were corrected by enlarging the vertical tail, thus changing its original highly tapered form to the more familiar squared-off shape.

By 1942, substantial numbers of A-20's were being sent to the USSR, some of them for the Soviet Navy's use as torpedo bombers. In all, nearly 3000 went [illegible] the airplane-hungry Russians. Most of these planes were A-20G's with heavy

Twin-tailed French DB-7A in early days of WW II [illegible]fore entry of United States. Few of these aircraft reached front before Fall of France. Many were diverted to British.



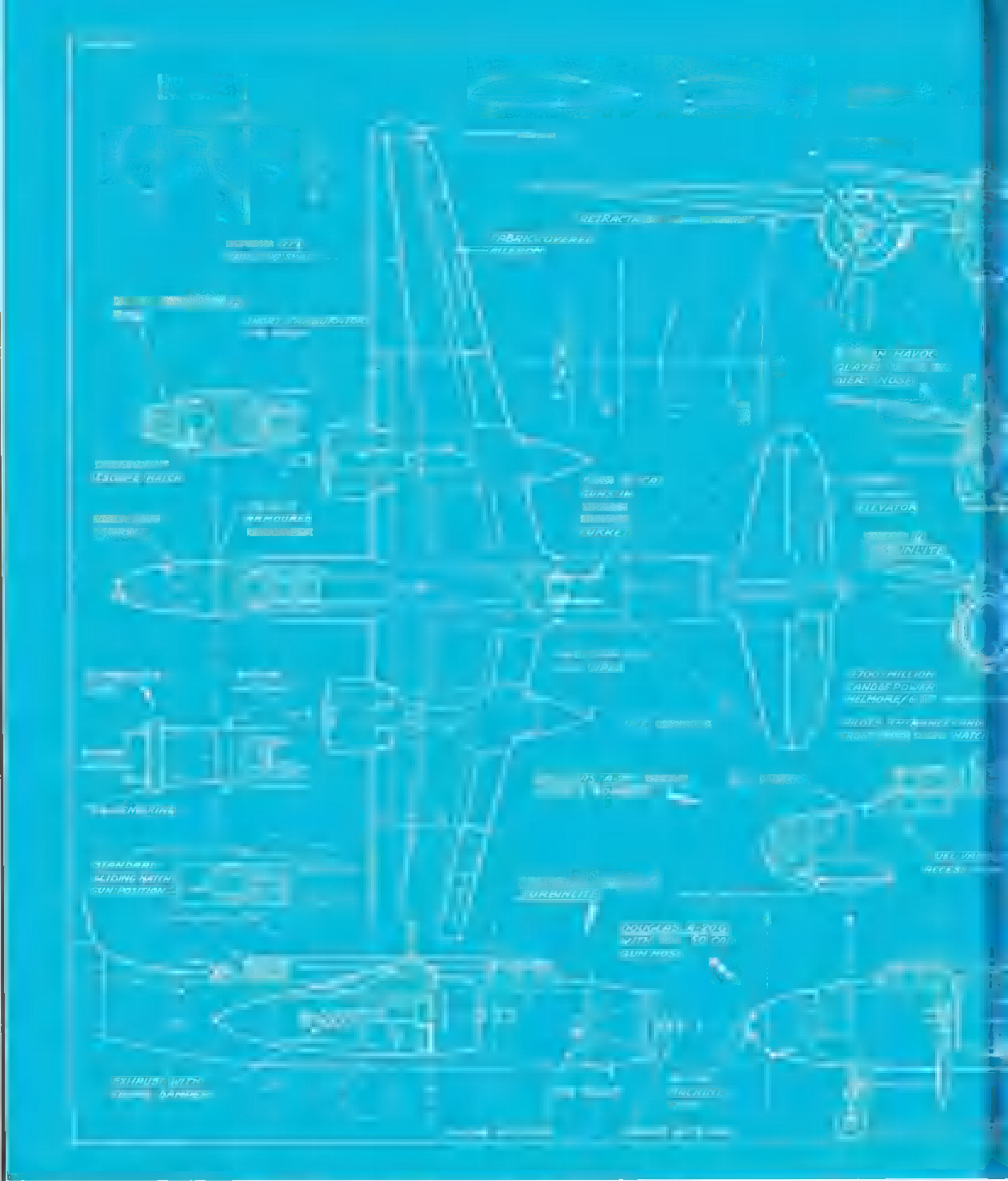
batteries of guns in the nose, which made them highly effective against tanks and other hefty ground targets.

The RAF's successful use of modified bombers for night-fighting purposes did not escape the notice of the USAAF, and about 270 A-20's were converted into what was then the Army's heaviest fighter plane, the P-70. The first of these carried four 20-mm cannon in a special package under the fuselage. The P-70 was used primarily to train pilots who eventually were assigned to the North-

(Continued on page 58)

Dimensions	Havoc I	P-70	A-20G-45
Wingspan	61' 4"	61' 4"	61' 4"
Length	46' 11¾"	47' 7"	48' 0"
Height	15' 10"	17' 7"	17' 7"
Wing Area	465 sq. ft.	465 sq. ft.	465 sq. ft.
Empty wt.	11,400 lbs.	16,030 lbs.	17,200 lbs.
Performance			
Top speed	295 mph	329 mph	317 mph
Service ceiling	25,800'	28,250'	25,000'
Range	996 mi.	1040 mi.	1025 mi.

A-20—first production version for USAAF; Wright R-2600-7 engines; 59 converted to P-70, 1 to XF-3, 2 to YF-3.
A-20A—143 built with R-2600-3 engines.
XA-20B—1 A-20A tested with three power turrets.
A-20B—999 built with Wright R-2600-11 engines.
A-20C—948 similar to RAF Boston III, Wright R-2600-23 engines.
A-20D—never built; would have had R-2600-7 engines.
A-20E—17 A-20A modified with Wright R-2600-11 engines.
XA-20F—1 A-20A, one 37 mm cannon, two power turrets.
A-20G—2850 built with Wright R-2600-23 engines.
A-20H—412 as A-20G with 1700-hp Wright R-2600-29 engines.
A-20J—450 built as A-20G with bomber nose; 169 to RAF as Boston IV.
A-20K—413 built as A-20H with bomber nose.
BD-1—several A-20A built for U.S. Navy.
BD-2—8 A-20B built for U.S. Navy.
DB-7—original design of series, ordered by French, diverted to RAF as Boston I and II. Pratt & Whitney R-1830 Twin Wasp engines.
DB-7A—100 for France became RAF Havoc II. Wright R-2600 engines.
DB-7B—300 for RAF as Boston III.
DB-7C—48 similar to Boston III for Dutch AF in exile.
DB-131—1 DB-7 tested by France with twin rudders.
XF-3—photo version of A-20.
YF-3—2 A-20 converted to photo recon.
F-3A—46 A-20J and A-20K converted to photo recon.
O-53—1489 photo recon versions of A-20B cancelled.
XP-70—A-20 modified to fighter with four 20 mm cannon in nose.
P-70—59 A-20 modified as fighters.
P-70A-1—39 A-20C modified as fighters.
P-70A-2—65 A-20G modified ▬ fighters.
P-70B-1—1 A-20G modified as fighter.
P-70B-2—105 A-20G and A-20J modified ▬ fighters.
Boston I—ex-French DB-7's to RAF for training.
Boston II—ex-French DB-7's to RAF as bomber.
Boston III—300 ex-DB-7B's to RAF.
Boston III Turbinlite—three Boston III with 2.7 billion candlepower light in nose.
Boston IIIA—Boston III built by Boeing for RAF.
Boston IV—169 A-20J for RAF.
Boston V—90 A-20K for RAF.
Havoc I—ex-French DB-7's to RAF as fighter.
Havoc I Turbinlite—31 Havoc I, 2.7 billion candlepower light.
Havoc II—ex-French DB-7A's to RAF.
Havoc II Turbinlite—39 Havoc II modified with light in nose.
Havoc III—became Havoc I "Pandora" version; 20 modified.
Havoc IV—became Havoc I (Intruder).
Douglas 7A—prototype, fighter ▬, P&W R-1830 engines.
Douglas 7B—prototype, bomber nose, P&W R-1830 engines.



Douglas BOSTON/HAVOC

Over 7000 of the Douglas A-20 were built for the RAF, USAF, and many governments in exile who [redacted] fighting from bases in England. Armaments, details, and missions varied in seemingly endless combinations. When, in 1944, production halted, the A-26 (a larger, faster brother) began rolling from the Douglas line.

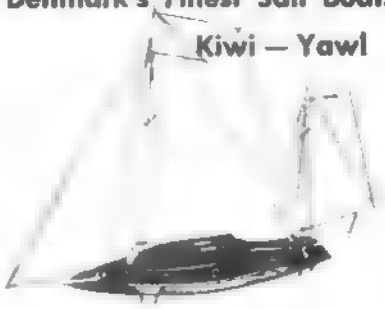
Some New Billing Boat Kits From Kayeff

All With Planked Hulls

SPERWER — Model of Dutch Canal Boat, in scale of 1:15. Length 23½", Width 9", height 32". Kit [illegible] complete with sails and decorative side paddle. Complete with fittings of brass — **$33.00.**

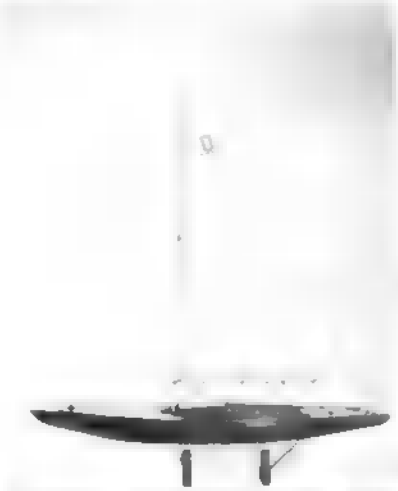
Denmark's Finest Sail Boats

Kiwi — Yawl



Excellent quality construction kit. 22½" long by 19½" high. Includes ribs, plank- [illegible] Brass fittings, cloth for sails. Complete kit, including fittings — **$11.00.**

VIKING SHIP KIT, Complete. This exciting new kit by Denmark's Finest Models features planked hardwood hull, and is an authentic reproduction, scaled down to [illegible]" long by 6½" wide. — **$16.00**



DRAGON International Racing Class. 31" long. Complete with fittings — **$29.00.**

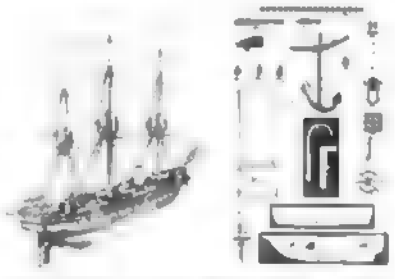
"Pirate" Racing Yacht

Approx. 24½" long. 33" overall height. Mast 27" hight. Excellent quality wood construction kit including [illegible] plate, ribs, and planking. Detailed instructions [illegible] plans.

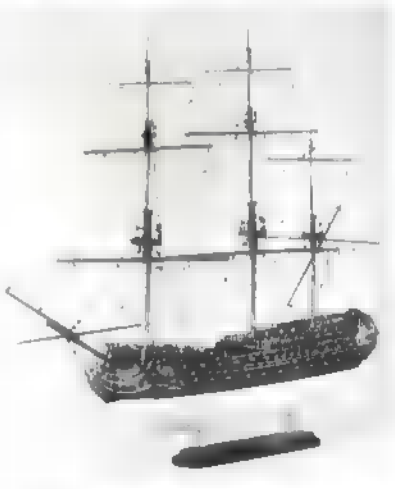
Complete with sails metal keel, and fittings. $10.00

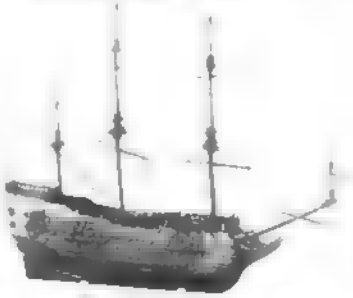
BLUENOSE. 35" long, 27" high. Beam 5½" with [illegible] fittings — **$52.00**

DANMARK Training Ship. 35½" long, 23½ high, 5½" beam. With fittings — **$75.00**



JYLLAND Frigate. 39¾" long, 24¾" high. Complete with fittings — **$65.00.**





WASA Warship from 1628, 23" long; 23" high. Complete with fittings — **$41.00.**

NORSKE LOVE NOrwegian Lion. 40" long, 36" high. With fittings — **$101.00.**

LILLA DAN. 26¾" long, 4¾" wide, 19¼" high. Complete with fittings — **$40.00**

SANTA [illegible], 21¾" long, 17¾" high, 5" beam. With fittings — **$24.00**

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Plane Talk From Kayeff!

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AUTO FERRY — About 20" in length, [illegible] to build. Planked hull construction. Typical [illegible] ferry, now in use in denmark. Kit and fittings complete — **$14.00**.

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TRAWLER — Model of North Sea Fishing Trawler, about 26" in length. Excellent detailing. Complete with fittings of brass — **$24.00**

VIKING SHIP (DMI) — Beautiful model of authentic Viking Ship. About 20" in length. Complete with sail and decorative side mounted shields — **$6.00**.

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[illegible] **$18.00** Each Postpaid

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#501	B-29 Boeing Four Engine	$60.00
#[illegible]	Super Constellation, [illegible] engine	$75.00
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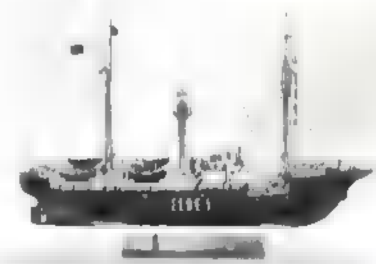
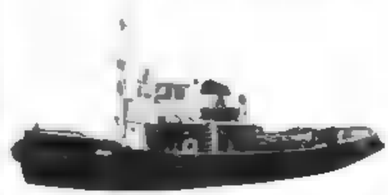


ELBE 1 Lightship. 39¼" long, 23¼" high; 6¾" beam. With fittings . . . **$97.00**



"Samson" Sea-going Tug. Unusually fine quality wood kit, with keel plate, ribs and planking. Excellent detailing includes rubber bumper [illegible] bow. Approximately 23½" long. Complete with metal fittings. — **$17.00**

ZWARTE ZEE Tugboat. 3-¾" long, 11½" high, 5" beam. With fittings. **$53.00**

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5 Ch. Decoder + Receiver	[illegible]	61.00	51.50
4 Ch. Decoder + Receiver	72.00	58.00	[illegible]
Add-A-Channel Decoder	—	—	7.98
Rx Pak Charger	7.98	—	5.98
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Digit Migit 1 Ch.	69.00		
S-4B Servo	30.00	22.98	18.98
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SERVO NOTES

The S-4C replaces the S-4, S-4A, S-3 servo and works with Controlaire, M.A.N., O.S. Digital Systems. The S-4B works with World Engines Blue Max Systems, Mule Digital, Digit Migit 3 Ch. and most other 4.8v center tap system decoders. The S-4D is very similar to the S-4C but is recommended for systems using SCS Decoders.

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Add $35.00 for 72 MHz and $25.00 for Single Stick Transmitter.

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Digit Migit 1 Channel up elevator or motor control servo kits at $22.50 each (kit only). You can use only one (not both) on 1 Ch. system.

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SERVICE EXPERTS

The service experts listed in this advertisement are, for the most part, people who have been working with Digitrio and other kit systems in the various areas mentioned. They have all put together an M.A.N. System from a raw kit and have agreed to stock parts that are compatible with World Engines Systems. They have been given schematics of World Engines Systems and current OS Digital Proportional Systems. Many of these service experts service other makes of equipment other than our own. Consider these people for repair work or for help in matching up our flight packs.

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NOVEMBER 1970

MODEL AVIATION

Official magazine

A.M.A. NEWS

Academy of Model Aeronautics • 806 Fifteenth Street N.W., Washington, DC 20005

The 1970 Nats - Bigger and Better

To the PR men involved, it was the biggest National Model Airplane Championships ever. Among contestants and officials, the consensus was that this was the best Nats ever. Producing the combination of biggest and best took some doing: good planning, innovations, excellent personnel, and a few breaks—including fine weather.

The statistics are impressive. One thousand, one hundred and forty-nine contestants, plus 395 mechanics. That compares with 1,074 contestants and 428 mechanics at Willow Grove (Pa.) in 1969 and 1,184 contestants and 217 mechanics at the previous Glenview Nats in 1966. There were 1,050 contestants entered in advance, by mail, for the 1970 Nats; 99 more registered at Glenview late entries.

There were more events than ever before—42 this year, compared with 38 in 1969. The increase was accommodated without increasing basic Nats staff and facilities, although the workload went up for the AMA people directly involved. The event breakdown by category: Control Line—18, Free Flight—13, Radio Control—6, Indoor—5.

Great Weather. A short storm cut off RC Pylon qualifications about hour early one day, but the weather otherwise did not interrupt flying—although winds during the first two days made Free Flight retrieving tough. It always hot, sometimes windy. But one glorious day for Free Flighters the weather so good that, despite hundreds of flights with dozens of maxes, there were no lost models—practically all stayed on the field, and events closed early because all flights were in, including some seven and nine flight flyoffs.

RC Scale had two great half-days of excellent weather—a total of ten hours shared by the entrants who actually flew. Many got in four flights—highly unusual for Nats—and all could have had that many. Truly spectacular was the fact that two B-36 entries (that's twelve engines!) got in five flights between them, without mishap. Even so, RC Scale was won by single-engined Spirit of St. Louis. It was the first Nats for builder-flyer **Ed Ellis** (Dearborn, Mich.) so the old pros took a back seat.

Single-engine entries dominated the RC Scale event, taking the top five trophies. But **Ken Drummond** (Orient, Ohio) won the Best Scale Flight Achievement award with his B-36 which dropped bombs with amazing accuracy—including one less than ten feet away from the judges!

Ken and Walt Burgin (Ottumwa, Iowa

(Continued on page 56)

Hail the champions! Bucky Servaites, receiving trophy from Admiral Greer, Chief of Naval Air Reserve Training, and Suzanne Bowie, Miss Model Aviation, retained his Open and Grand National Champion titles from last year and took the new Category award this year. Sharing in the spotlight are Marty Thompson (L) and Brian Webster, Junior and Senior National Champions.

The Delta Dart program ran for five Nats days during which over 2,000 youngsters took part. Below left, Miss Model Aviation builds her Hloo Flyer version of the DD, watched over by Navy instructor plus HIAA's Walt Caddell and AMA's John Worth. Below right, during Nats, AMA's 30'000th '70 membership went Matt Whitson—received special award from John Worth.

NATIONAL CHAMPIONS

Grand Champion
Bucky Servaites, Dayton, Ohio
Junior
Marty Thompson, Livermore, Calif.
Senior
Brian Webster, Manchester, Tenn.
Open
Bucky Servaites, Dayton, Ohio
Control Line Category
Danny Bartley, High Point, N.C.
Free Flight Category
Bucky Servaites, Dayton, Ohio
Indoor Category
James Richmond, Oak Brook, Ill.
Radio Control Category
Larry Leonard, Northridge, Calif.
AMA Club Team
Chicago Aeronuts (Charles Markos, Richard Lyons, James Richmond, Charles Sotich and Robert Watson)
Nats Team
USAF Champions (Robert Adair, Keith Trostle, Hoyt Hawkins, Burt Dugan and Philip Bayle)

PERPETUAL TROPHIES & SPECIAL AWARDS

Tulsa Glue Dobbers (high time regardless of age, Nordic A-2 Glider): Peter Allnutt, Toronto, Ont., Canada.
Mulvihill (high time regardless of age, Unlimited Rubber): Willard Stultz, Kenosha, Wisc.
Tulsa Glue Dobbers (high time regardless of age, Outdoor HL Glider): Don Chaney, Richardson, Tex.
Hoffman Memorial (high time regardless of age, A FF Gas): Andy DeMello, Toronto, Ont., Canada.
Testor's (best model finish, regardless of age): Leroy Gunther, Allen Park, Mich.
Jim Walker (winner of Junior-Senior-Open Ukoff, CL Stunt): Keith Trostle, Nickerson, Kans.
Stout Indoor (high time regardless of age, Indoor Cabin): James Richmond, Oak Brook, Ill.
Stout Commercial (high time regardless of age, Indoor Stick): James Richmond, Oak Brook, Ill.
Sterling Models (best Flying Scale model of any category): Edward Ellis, Dearborn, Mich.
St. Louis Modeling Assn. (most unique Scale model): Fulton H. Hungerford, Taneville, Ill.

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Approximately 600 awards were provided through the contributions of the following:

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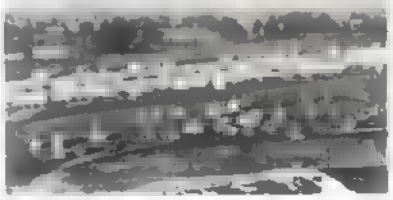
NATS ENTRIES

	Jr.	Sr.	Open	Total
Number of Entrants	212	176	761	1149
Number of Mechanics				395

Entries by Event

Control Line	Jr.	Sr.	Open	Total
Scale Racing (Goodyear)	26	22	71	119
Ray Racing	18	30	65	113
R Proto Speed	3	14	32	48
½A Profile Proto	29	(Jr. only)		29
½A Proto Speed	5	18	37	59
FAI Speed	8	7	[illegible]	30
½A Speed	10	10	25	57
A Speed	6	13	29	48
B Speed	5	12	33	50
C Speed	5	11	28	44
Jet Speed	1	7	26	34
Stunt	22	24	47	93
Combat	34	39	84	157
FAI Team Racing	1	7	24	32
Scale	11	10	29	50
Carrier I	5	10	41	56
Carrier II	4	0	38	42
Profile Carrier	13	15	29	57
Indoor				
Scale	12	8	70	90
H.L. Glider	30	34	88	161
Paper Stick	18	11	40	69
Cabin	7	8	19	34
Stick	7	0	31	47
Free Flight				
½A Gas	74	54	203	331
A Gas	41	44	188	273
B Gas	16	33	151	190
C Gas	15	28	127	170
FAI Power	7	16	83	106
Wakefield Rubber	5	7	51	63
Unlimited Rubber	27	16	84	127
Coupe D'Hiver Rubber	11	10	82	103
Nordic Glider	42	28	137	217
H.L. Glider	89	62	156	307
Rocket Power	18	20	76	114
Scale	0	0	61	69
Helicopter	0	1	7	8
Radio Control				
D Pattern	5	7	92	104
B Pattern	1	4	17	22
A Pattern	4	5	27	36
Scale	1	2	30	43
Pylon I	2	8	72	82
Pylon II	1	5	46	51



Above, camper center greatly relieved barracks shortage. Left, attendance at the Sunday Air Show was tremendous. Models and Navy's Air Barons featured.

CL Scale Racing, ■ new Nats event, had big entry list. Glenn Lee, left, and Ron Waldron shown with their ST 15 Pitts Special entry.

Open Stunt winner Keith Trostle exhibited in the Air Show. His original design has Focke Wulf Tu 135 looks

CONTROL LINE

½A SPEED

Junior	mph
1 Brian Pardue	94.01
2 [illegible] Lee	90.23
3 Marty Thompson	79.40
4 Bruce Pallet	70.56
Senior	
1 Terry Herron	94.60
2 Tom Hartigan	92.18
3 Danny Bartley	90.33
4 Mary Brown	88.20
5 Bruce VanHoozen	86.84
Open	
1 Finn/Morton	100.72
2 Warren Kuith	103.81
3 Charles Lees	103.20
4 Amaston/Russell/ Phillip	101.54
5 Bartley/Garner	93.32

A SPEED

Junior	mph
1 Dennis McGraw	132.83
2 Brian Pardue	126.00
Senior	
1 Mary Brown	151.20
2 Terry Herron	148.21
3 Gary McGraw	136.72
4 Danny Bartley	131.24
5 Bruce VanHoozen	120.82
Open	
1 Charles Vassallo	162.24
2 Bates/Beatty	160.51
3 Finn/Morton	154.44
4 Alfred Siegens	151.58
5 Clifton Norman	144.40

■ SPEED

Junior	mph
No official flights	
Senior	
1 Danny Bartley	167.27
2 Gary McGraw	155.78
3 Charles Schubert	150.32
4 Brian Webster	149.09
5 Robert Mann	142.01
Open	
1 Roselle/Fuse	169.42
2 Amaston/Russell/ Phillip	167.68
3 C. Fred Ramsell	161.62
4 Glenn Lee	159.70
5 Bartley/Garner	150.05

C SPEED

Junior	mph
1 Michael Hainen	139.81
2 Dennis McGraw	139.07
3 Thomas H. Bell	135.80
4 Mark Pafeddi	80.00
Senior	
1 Danny Bartley	180.07
2 Robert Mohr	168.00
3 Nerson/Nerson	167.84
4 Mary Brown	165.00
5 Gary McGraw	164.02
Open	
1 Roselle/Fuse	189.40
2 Bartley/Garner	188.41
3 Garzon/Alpino	180.47
4 Dravenit Brohe	174.35
5 Robert Hemingway	173.17

JET SPEED

Jr.-Sr.-Open	mph
1 Mike Olson	170.87
2 Seymour Olson	170.55
3 Myrle Hoyt	169.11
4 Danny Bartley	162.10
5 Baughman/Yoho	158.53

FAI SPEED

Junior	km/hr
1 Michael Hainen	164
2 Brian Pardue	162
Senior	
1 Danny Bartley	179
2 Bruce VanHoozen	165
3 Mary Brown	160
4 Robert Mohr	141
5 Charles Schubert	136
Open	
1 Laird Jackson	214

2.	Carl Dodge	213
[illegible]	Clifton Norman	195
4.	Keith Trostle	173
5.	Finn/Morton	169

½A PROTO [illegible]

Junior—Profile		mph
1.	Bruce Pallet	74.23
2.	Walter Gifford	71.49
3.	Brian Pardue	70.09
4.	Marty Thompson	69.47
5.	G. Hubschmidt, Jr.	69.39

Junior		
1.	Ross Legg	81.97

Senior		
1.	Danny Bartley	90.14
2.	Tom Hartvigsen	89.38
3.	Terry Herron	84.75
4.	Bruce VanHoozen	81.42
5.	John Jaycox	74.35

Open		
1.	Bartley/Garner	95.91
2.	Charles Legg	94.05
3.	Warren Kurth	[illegible]
4.	Anaston/Bussell/Phillip	88.42
5.	Finn/Morton	88.16

B PROTO SPEED

Junior		mph
1.	Michael Hainen	116.04

Senior		
1.	Danny Bartley	146.40
[illegible]	Terry Herron	130.50
3.	Mary Brown	[illegible]
4.	Charles Schubert	122.53
5.	Brian Webster	111.72

Open		
1.	Jim Delaney	148.09
2.	Bartley/Garner	144.40
3.	Finn/Morton	134.48
4.	Draycott Hooks	124.05
5.	John Camp	115.08

AEROBATICS (STUNT)

Junior		Points
1.	Mike Jackson	430
2	Alan Adamisin	371
3.	Greg Voumard	[illegible]
4.	David Sain	348
5.	William Miller	344

Senior		
1.	Tommy Morgan	504
2.	Neal Thompson	491
3.	Dennis Adamisin	470
[illegible]	Dawn Cosmillo	460
5.	Michael Thompson	458

Open		
1.	Keith Trostle	480
2.	William Rabe, Jr.	475
3.	William Werwage	473
4.	Robert Lampione	460
5.	Gene Schaffer	464

COMBAT

Junior

1. Jeff Davis
2. Tom Autrey
3. Greg Voumard
4. Brian McCormock
5. William Miller

Senior

1. Jonathan Drake
2. Laurence Moore
3. Tommy Morgan
4. Neal Thompson
5. Richard Sherman

Open

1. Howard Rush
2. Gilbert Reedy
3. Ronald Sheldon
4. Robert Baldus
5. Daniel Patton

FAI TEAM RACE

Jr.-Sr.-Open		Time
1.	Dunkin/Wright	9:48.0
[illegible]	Oesterle/Drake	11:10.7
3.	Albritton/Marvin	
4.	William Patton	
5.	Prather/Schauer	

RAT RACE

Junior		Time
1.	Tom Tums	6:09.3
2.	Brian McCormock	6:35.8
3.	Jeff Davis	7:50.9
4.	Ricky Draper	10:00.0
5.	Robert Ponik	

Senior		
1.	Tim Zimmer	5:31.2
2.	William Cook, Jr.	5:37.0
3.	Edward Niemiec	5:49.0
4.	Terry Herron	5:52.6
[illegible]	Robert Myres	6:15.9

Danny Bartley, a Senior age class entry, did some very fast Speed flying [illegible] become the Control Line Category Champion. B Proto model shown—146.40 mph Sr. first.

Greg Voumard placed third in Junior Combat against some stiff competition. He flew a Guillotine model powered by [illegible] K [illegible] B 35, crankcase pressure, 9-7 Tornado nylon prop.

Ed Sensenbaugh's Carrier [illegible] Guardian in foreground is powered by a Supertigre [illegible] ABC engine and 8-10 prop.

First place in Junior ½A Proto Speed was taken by Ross Legg, age 14. Engine being started by his dad, Charles.

Open		
1	S. Simpson III	5:30.5
2	Roy Gould	5:36.4
3	James Hainen	5:45.6
4.	Brian Prolss	5:47.2
5	John Tulach	5:49.1

SCALE RACING (GOODYEAR)

Junior-Senior		Time
1	Michael Hainen	8:16
2	Bill Cook	8:15
3.	Stephen Wozny	8:21
4.	James Hojnacki	5:37
5	Alan Adamisin	9:07

Open		
1	John Barnhart	7:36
2.	John Kilsdonk	7:37
3.	Gary Fettiress	7:40
4.	Glenn Lee	7:41
5	John Flinn	7:54

NAVY CARRIER PROFILE

Junior		Points
1	Mike Willmann	[illegible]
2	Stanley Snade	[illegible]
3	Richard Dolg	128.16
4.	Jay Rosenberg	117.[illegible]
5	John White	54.36

Senior		
1.	David Engel	209.90
2.	Mark Eaton	[illegible]
3.	Anthony Carolla	172.99
4.	Edwin Zivi	119.65
5.	Donald Cline	72.66

Open		
1.	Paul Smith	295.62
2.	Joseph Flinn	279.06
3	James Hainen	277.[illegible]
4.	James Blaszczyk	[illegible]
5.	Frank Polowy	256.52

NAVY CARRIER I

Junior		Points
1	Robert Sawicki	416.35
2.	James Jones, Jr.	344.10
3.	Dale Johnson	317.04
4.	Billy O'Connor	226.07

Senior		
1	Douglas Tomayko	467.08
2	Michael Bedard	459.79
3	Robert Mohr	458.32
4	[illegible] Wright	407.93
5	Joseph Dzialo	382.15

Open		
1.	Ray Willmann	559.98
2	Donald Gerber	542.90
3.	Marion Sawicki	531.78
4.	Harold Wallick	519.[illegible]
5	Glenn Simpson	511.08

NAVY CARRIER II

[illegible]		Points
1	Robert Sawicki	423.[illegible]
2	Dale Johnson	418.98

[illegible]or		
1	Douglas Tomayko	505.47
[illegible]	Michael Bedard	393.47
3	Neal Thompson	264.[illegible]
[illegible]	Joseph Dzialo	197.26

Open		
1	[illegible] Willmann	590.86
2	Donald Gerber	572.01
3	Edwin Gross, Jr.	[illegible]
4	Richard Sawicki	541.42
5	Raymond White	531.67

FLYING SCALE

Junior		Points
1.	Cathy Burnstine	253
2.	Billy O'Connor	221
3.	Robert Butler	195
4	[illegible] Miller	179
5.	Robert Wolff	151

Senior		
1.	John Glab	219
2.	Dale Hungerford	206
3.	Dirk Ouweleen	182
4.	Robert Morse	179
5.	James Damerell	174

Open		
1.	Linton Keith, Jr.	495
2.	E. Violett, Jr.	453
3.	Bert Dugan	[illegible]
4.	Frank Beatty	421
5.	Bill Boss	420

Left, Senior Stunt flight just beginning by Miss Dawn Cosmillo—original design. Right, the Rosella-Frye team maintained their superiority in C Speed, and this year they also won B. [illegible] engine is original, similar to TWA.

Lots of man-hours went into the PT19 CL Scale model of AMA VP Bill Boss. Three years in construction, it placed 5th.

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Ace R/C Inc.

ACE R/C

SERVES YOU FOR ANY R/C NEED
SERVING YOU SINCE 1953

Hello!

These are busy, busy, busy times! The reception of Commander R/O Packs continues to be utterly fabulous. The demand is increasing, which pleases us greatly, because it indicates that you have found that they combine the simplicity of installation and operation and maintenance, with the sophistication and the same reliability of the high priced spreads. This is the first that any manufacturer has offered these very versatile, adaptable, pulse units that completely designed to work as systems. These are no longer any hodge podge of unrelated components which are put together with baling wire and a prayer.

The year 1971 like it will be a fantastic R/O Pulse year, because we a number of things which we'll to our pulse line.

One that we're working on for 1971, on which we are ready to begin deliveries NOW, is wings which are designed for small aircraft such as the Dick's Dream and the Citabria, and also sport type airplanes such as the Skampy 2, by designer Owen Kampen, pictured .

These are the foam which a hit at Atlanta, Oklahoma City and Toledo trade shows, and RCM said "Someone make them available." are—NOW!

They developed by Owen Kampen, and Owen is known for the flyability of his planes. The wing work is with the Citabria plans that have selling, and some slight modification is required for the Dick's Dream, but this is minor, and IF YOU REQUEST IT, will the modifications with your for the constant chord wings. Citabria and Dick's constant chord.

The Skampy requires the taper section. more as to the availability of plans for this and other taper wing section plans later.

think that 35" wing sections (see details elsewhere) represent an important break through for the modeller. They will provide aircraft which is designed to fit beautifully with our Commander R/O Pulse Systems in the Baby Baby Twin .

These wings have undergone development and testing for well two . The airfoil is especially designed for small aircraft by Owen Kampen, the foam provides great flexibility with high strength, and a bead which provides exceptionally light weight in the time.

Join in the fun!

Keep 'em pulsing,

Paul F. Runge
Ace Radio Control, Inc.

A HANDFUL FOR YOUR PLEASURE

For the modeler who has been looking for superhet systems which are ultra light to go into the mini and micro series of airplanes!

Weight of the receiver and the small Bentert than 1 ounce, and depending on your battery choice you can keep the weight well under 1¼ ounces.

This is excellent for the mini and micro plane enthusiasts, and also is finding increasing use in the boost glide phase of model rocketry.

We are listing below all of the components required for an ultra light weight installation, and you can select your handful of pleasure to fit your application.

The receiver compatible with our R/O Pulse Commander Transmitter, and this may had separately or you add this handful of pleasure airborne package to your present R/O system.

COMMANDER MICRO GEM RECEIVER

The Micro Gem is available in two models. This a proven design of which thousands are in satisfactory use throughout the world. The receiver measures 1 1/16 x 1 1/2 x 1/2 inches. Weight of the bare receiver less hook-up wires is .5 ces. With light weight hook-up wire .7 ounces. Operation is on 2.4 volts with phenomenal range; used with volts.

The two models are the DE, which has a double output to feed into the Adams style actuator, and the SEB, which is designed for the Bentert type of actuator only.

No. 12K2—Commander DE Gem Rx $31.50
No. 12K3—Commander SEB Gem Rx 30.75
(For the Bentert only)
(Available all 27 MHz except 27.255.)

COMMANDER R/O TRANSMITTER

The foregoing receivers compatible with our Commander Pulse Transmitters. Requires 9 volt battery of M1603 type.

No. 11K1—Commander R/O Tx $42.50
(Available 27 MHz except 27.255.)

BENTERT ACTUATORS

These single coil units with magnetic return. Small model weighs 7.5 grams and draws 50 at volts. Large model weighs 15 grams and draws at 3 volts.

No. 14K1—Small Bentert Actuator $9.95
No. 14K2—Large Bentert Actuator 9.95

MALLORY MS76 SILVER OXIDE

Non-rechargeable 1 1/2V. Good for 60-90 minutes with Gem and Bentert. Only 2.2 grams; .46 .21".
No. 38K32—MS76 Silver Oxide cell, ea. $.50

50 BUTTON NICAD

Rechargeable 1.25V. Only 3 grams; .606 x .230". Solder tabs.
No. 38L4—Nicad B50T Button/tabs, ea. $1.39

MA BUTTON NICAD

Rechargeable 1.25V. Only 8.5 grams; 63/64 x 1/4". Solder tabs.
No. 38K29—Nicad B100T/tabs, ea. $1.70

2.4V/B100T PACK

Two of above 100 cells stacked for 2.4V pack with tabs. Measure 63/64 x 1/2".
No. 38K9—2.4V/B100T Pack $3.65

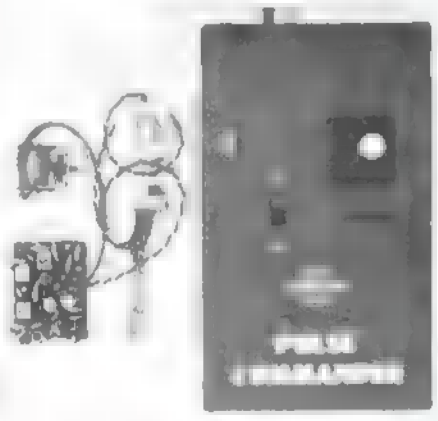
PULSE .. Best Choice for You!

FULLY PROPORTIONAL–BUILT-IN RAND STICK WITH TRIM; ALL BATTERIES SUPPLIED, NICKEL CAD PAK FOR AIRBORNE UNIT; THOUSANDS IN USE

RUDDER ONLY PULSE IS:

- FULLY PROPORTIONAL!
- LIGHTEST--2.5 oz. for Baby
- LOWEST COST--Packages include ALL batteries; Airborne cost pack uses nickel cads for repeatability and dependability; need only recharging.
- SIMPLEST--only one moving part, noise free
- VERSATILE--arrange to suit your particular installation. You can go up in size or down in size. You can then go micro and mini, and not obsolete your transmitter or basic [illegible]. Simple changes of battery and actuator allow a variety of installations. Motor control can be easily added to larger units.
- EASY to install
- GREAT for Beginners--CHALLENGING to the pros.
- FUN!

WITH ALL BATTERIES!



COMMANDER R/O PULSE PACKAGES

Ideal for Beginners and Sport Flyers

Now available in four sizes!

The Commander R/O packages contain the Commander DE 2,4 superhet receiver, Commander Pulse Transmitter, Adams actuator size of your choice, and nickel cads, wired with on-off switch. AND each package saves you $10.00 over buying components separately.

The R/O Packages are available in [illegible] sizes for most sporting needs from the smallest to the larger aircraft--or boats. Ready for installation, completely wired and tested.

The Baby is for .010 to .020 jobs. Has two 225 ma Nickel Cadmiums and the regular Baby Adams. Airborne weight is 2.5 oz.

The Twin Baby is for hot .010 to .020 jobs. As above, except uses Twin Baby actuator. Airborne weight is 2.9 ounces.

The Standard uses the Single Adams for more power for .049 to .07 size. Uses larger capacity nickel cads. Airborne weight is 4.5 oz.

The Stomper uses the Twin Adams actuator for up to .15, [illegible] can [illegible] boosted for use with .19. Airborne weight is 4.9 oz.

(Charging equipment extra)

No. 10G15—Commander R/O Baby pkg. $69.95
No. 10G15T—Commander R/O Twin Baby 72.95
No. 10G16—Commander R/O Standard 71.95
No. 10G17—Commander R/O Stomper 74.95
Available all 27 MHz, except 27.255. Specify.

Thousands of Satisfied Users

ACE FOAM WINGS

Here are the 35" span foam wings that were the hit of the Atlanta, Oklahoma City, and Toledo trade shows. They are available in two configurations--constant and tapered. The airfoil is especially designed for small aircraft, and is semi-symmetrical.

They were developed by Owen Kampen, working in conjunction with the late Dick Adams.

The constant chord measures 35" span, [illegible] is 5½" wide for an [illegible] of 192.5 square inches. Weight is [illegible] 3 ounces.

The tapered section [illegible] 35" span, center [illegible] 5½, which tapers to 4", and has a total [illegible] 166.25 square inches. Weight is just over [illegible] oz.

Wings come in two pieces of 17½" [illegible] they may be easily epoxied for the correct dihedral. May [illegible] used unfinished or finished with [illegible] polyurethane varnish; or striped with Monokote for trim.

The constant chord section may [illegible] used with the Dick's Dream with slight modifications on the fuselage (we have poop for [illegible]ese mods, but you MUST REQUEST it). Citabria works by adding 1/2" [illegible] strip. Taper section may be [illegible] with design [illegible] published later.

Also lend themselves excellently for the home-brew builder who wants a proven and tried airfoil which will provide satisfaction and service.

[illegible] small--with foam; a real breakthrough! Makes planes which are [illegible] for the Cox [illegible] TD .020 engines [illegible] Commander Baby [illegible] Baby Twin R/O packages.

No. 13L166—Ace Foam Taper Wing $2.95
No. 13L192--Ace Foam Constant Wing 2.95

COMMANDER CHARGERS

No. 34K4—Commander Baby Charger $4.95
No. 34K5--Commander Std.-Stomper Chg. 4.95

NICKEL CAD TX BATTERY PACK KIT

If you [illegible] a regular flyer of your Commander [illegible] system, you have found that the transmitter battery [illegible] [illegible] down fairly fast. This is because this [illegible] a powerful transmitter. If you want to avoid the continuing [illegible] and also assure yourself with a reliability and dependability on your transmitter [illegible] you have [illegible] your receiver pack, [illegible] nickel cad.

[illegible] have a completely assembled battery which measures 1 3/8" diameter by 2 11/16" long. Has lugs for ea[illegible] attachment of wires. Made [illegible] [illegible] seven 500 MAH nickel cadmium type batteries. 8.75 volts. Will easily fit the Commander series of transmitters. Comes complete with charging jack and mounting hard[illegible] in kit. Check dimensions of your case for use in other transmitters.

No. 38H74—XL-ent K9V Transmitter $10.00
Nickel Cad. Battery Supply Kit

(If you order this at the [illegible] time as your Commander Pack, we will install. Request installation on your order, and it will [illegible] done without charge.)

PLANES JUST FOR FUN!

Easy to build, easy to maintain, and low in cost and upkeep, th[illegible] new breed is fine for beginners. AND more and more of the big plane fliers are joining in on the fun so they [illegible] keep their hands in--or teach their youngsters.

To help [illegible] Fun Plane along, Ace is offering two plans now. More later. These are full size with enough details to allow almost anyone with just a bit of experience to build and fly. They [illegible] are designed specifically for radio gear of no [illegible] than 3 ounces--and here [illegible] where the new Commander R/O Baby Twin pack comes in. Just right and proven dependability!

Rudder-Only does allow you much more than simple steering--you can do loops, spirals, Split [illegible], and many more. You can gain or lose altitude simply by widening or tightening your turn.

DICK'S DREAM

This 34" job is designed by Owen Kampen. Named for [illegible] late Dick Adams who developed the magnetic actuators. Essentially this [illegible] a scaled down Whiz Kid, but has a few features especially for this size plane. Easy construction. Plans are full size.

No. 13K29—Dick's Dream Plans $1.00

CITABRIA

This semi scale is a design by Roman Bukolt. Has 34" span and features simple slab construction. Another eye catcher at the Toledo Conference. Full size.

No. 13K30—Citabria Plans $1.00

COMMANDER GALLOPING GHOST

Rudder, Elevator, Motor--One Actuator

No. 10G18—Commander Ghost $109.00

COMMANDER FAST [illegible]ULSE PACK

Rudder, Elevator, Motor--Two Actuators

No. 10G19—Commander FP $139.00

All 27 mHZ frequencies, except 27.225.

NEW HANDBOOK-CATALOG
For the [illegible] Flyer and Tinkerer

[illegible] RADIO CONTROL • [illegible] 301 • HIGGINSVILLE, MO. 64037

Our NEW Handbook Catalog is bigger and better than ever. We specialize in equipment for the Beginner, Sunday, and Fun Flyer. More items for the do-it-yourselfer, more products from most major manufacturers, in addition to many Ace exclusives. Greatly enlarged HANDBOOK section. Last year it was called "bible for R C [illegible]s MUST" by R C editors. Price is just $1.00 POST PAID. This is completely refundable on your first order. And that order also puts you on our mailing list for our newsletters and R C Data Service—acclaimed the world over. You can't lose—send your buck on a round trip today. It could be the best dollar you ever spent!

Important: For overseas delivery [illegible] catalog or Binder please add 50¢ for additional postage.

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QUANTITY	STOCK #	NAME [illegible] ITEM	PRICE	TOTAL

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Guaranteed delivery anywhere. Orders over $5.00 sent prepaid. Orders under $5.00 please add 5¢ for postage and packing

RADIO CONTROL

Ed Ellis' Spirit of St. Louis is modeled after the aircraft residing in the Henry Ford Museum. It won RC Scale first and also the Sterling Models Award. Wingspan is 80½".

D PATTERN QUALIFYING

Jr.-Sr.-Open	Points
1. Jim Kirkland	8695
2. James Whitley	8520
3. Ron Chidgey	8435
4. James [illegible]	8350
5. Larry Leonard	8340
6. Philip Kraft	8335
7. James Martin	8325
8. [illegible] Edwards	8295
9. [illegible] Coleman	8260
10. [illegible] Bonetti	8260
11. Bob [illegible]	8225
12. Norman Page	7990
13. William Salkowski	7910
14. Douglas Spreng	7795
15. Donald Lowe	7785
16. Cliff Weirick	7780
17. John Dougherty, Jr.	7695
18. George Hill	7670
19. Robert Noll	7645
20. Alan Dupler	7585

Best Junior
Billy Hiller

Best Senior
Bob Smith

D PATTERN FINALS

Jr.-Sr.-Open	Points
1. Jim Kirkland	14140
2. James Edwards	14045
3. Philip Kraft	14025
4. James Whitley	14000
5. Larry Leonard	13800
6. Don Coleman	13735
7. Ron Chidgey	13665
8. Norman Page	13555
9. James Martin	13480
10. Tony Bonetti	13440
11. Donald Lowe	13320
12. James Oddino	13307
13. William Salkowski	13185
14. Douglas Spreng	12860
15. [illegible] Smith	12855
16. Cliff Weirick	12700
17. George Hill	12480
18. Alan Dupler	12180
19. J. Dougherty, Jr.	11805
20. Robert Noll	11775

B PATTERN

Jr.-Sr.-Open	Points
1. Steve Buck	482
2. Keith Fisher	468
3. Ben Mathews	450
4. Ernie Weiss	422
5. Robert Eaon	394

Best Junior
None flew

Best Senior
Steve Buck

A PATTERN

Jr.-Sr.-Open	Points
1. Hank Clark	320
2. James Marshall	310
3. Paul Goell	311
4. Henry Smith	290
5. Randy Shartle	292

Best Junior
Brian McAvoy

Best Senior
Randy Shartle

PYLON FORMULA I

Jr.-Sr.-Open	Points
1. Bertken/Smith	19
2. Alvin Sager	19
3. Vernon Smith II	18
4. Larry Leonard	17
5. Robert Upton	14

Best Junior
James Hiller

Best Senior
[illegible]st Senior
Bertken/Smith

PYLON FORMULA II

Jr.-Sr.-Open	Points
1. Larry Leonard	20
2. Edward Keck	18
3. Vernon Smith II	17
4. Austin Leftwich	17
5. Telford/Violett	16

Best Junior
Brian Hattle

Best Senior
Whit Stockwell

SCALE

Jr.-Sr.-Open	Points
1. Edward Ellis	15280
2. Frank Noon	14828
3. Richard Graham	14574
4. William Bertrand	12618
5. John Roth, Jr.	12001

[illegible] Flight Achievement
Kenneth Drummond

Best Junior
James Hiller

Best Senior
Whit Stockwell

The winning D Pattern model by Jim Kirkland is an original design with appearance similar [illegible] the Navy's A-6 Intruder. Lee Custom engine, KDH retracts, Pro Line.

In Formula I Pylon, a flyoff between Al Sager and the Bertken/Smith [illegible] (shown) [illegible] necessary to decide the winner. The B/S team finished barely ahead of Sager.

Left, Jim Edwards flew Dragon Fli model to [illegible] Pattern 2nd. Pro Line radio, KDH retracts. Right, B Pattern model of Denver entrant James Wilmot had [illegible] much lift—used soda straw spoilers.

Claude McCullough flew a Douglas Sky Pirate in RC Scale. During the Nats an AMA Scale Contest Board was authorized, McCullough its chairman.

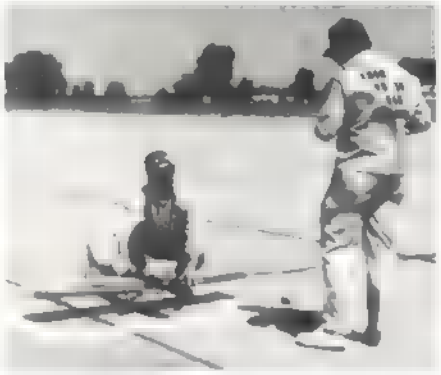
Ken Drummond won Flight Achievement Award with RC Scale B-36. Note wing tip assembly, important in transporting 115" span.

Above, Formula I start—Bud Phillips and Bror Faber in foreground. "Sandbagging" at the start was common. Right, it's nice to see RC Pylon togetherness when Lois and Brian Ehmke [illegible]

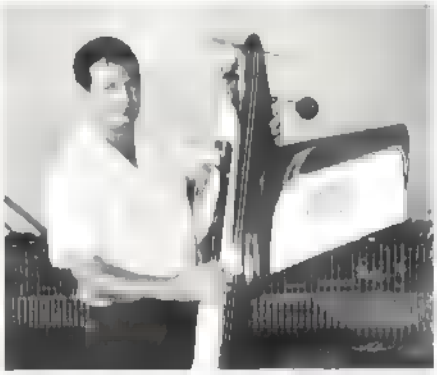
New in RC D Pattern this year, but certainly not new ■ aerobatic flying is Jerry Worth. Many recognize him for his CL Stunt efforts.

Larry Leonard cleans up his Formula II Shushonick with which he placed first. ■ is the RC National Champion for the second year in ■ row.

Special thanks go to the Hewlett-Packard Co. and Collins Radio Company for loaning equipment (and training operators) for monitoring radio transmissions and possible interference.



Original model by Robert Eson placed 5th in ■ Pattern. It is powered by ■ Enya 60, KO muffler, Graupner plastic prop. ■ Loss holds.



Ron Chidgey named his original D Pattern model "Tiger Tail." It has ■ foam wing, muffled Lee Super 60 power, TF 11-7½ prop.

INDOOR

CABIN

Junior	Time
1. Tom Sova	11:23.4
2. Michael Kuehne	7:41.8
3. Barry Pallet	5:03.0
4. Bruce Pallet	4:58.0
5. William Schlarb	4:33.8
Senior	
1. Ronald Ganser	13:51.7
2. Daniel Domina	13:43.2
3. Terry Kuehne	7:50.2
4. Dale Hacker	7:48.5
5. Susan Weisenbach	5:24.2
Open	
1. James Richmond	20:25.2
2. Bucky Servaites	19:16.2
3. Ronald Ganser	17:29.2
4. Charles Sotich	17:10.4
5. Al Rohrbaugh	16:36.2

STICK

Junior	Time
1. Tom Sova	18:26.1
2. William Schlarb	11:05.0
3. Bruce Pallet	10:47.0
4. Michael Kuehne	10:43.1
5. Barry Pallet	9:34.0
Senior	
1. Jan Servaites	14:45.0
2. Ronald Ganser	14:00.8
3. Terry Kuehne	13:19.6
4. Jeffrey Annis	12:27.0
5. Susan Weisenbach	12:25.0
Open	
1. James Richmond	34:33.8
2. Clarence Mather	30:44.0
3. Ronald Plotzke	28:14.2
4. Daniel Belleff	26:55.6
5. Manuel Andrade	25:08.0

PAPER STICK

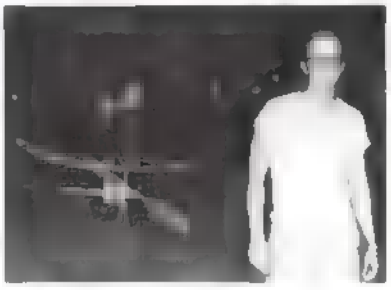
Junior	Time
1. Barry Pallet	10:37.1
2. Tom Sova	10:26.8
3. William Schlarb	9:47.8
4. Michael Kuehne	9:06.5
5. Steve Bandt	8:57.0
Senior	
1. Jan Servaites	■:45.6
2. Jeffrey Annis	11:47.9
3. Richard Hixon	11:30.1
4. Susan Weisenbach	11:29.2
5. ■ Hacker	10:32.2
Open	
1. James Richmond	21:34.2
2. Al Rohrbaugh	20:30.3
3. Clarence Mather	18:50.6
4. Edward Stoll	18:24.0
5. Joseph Sova	16:44.7

H.L. GLIDER

Junior	Seconds
1. Marty Thompson	118.2
2. John Lorbiecki	100.2
3. James Haught	89.0
4. Michael Tafbi	85.3
5. Michael Kuehne	85.2
Senior	
1. Richard Hixon	116.0
2. Paul Andrade	108.6
3. George Pharr, Jr.	105.7
4. Paul Tobie	104.9
5. Daniel Domina	101.7
Open	
1. Dennis Bronco	■■.6
2. Robert Watson	123.6
3. Bucky Servaites	121.4
4. Ronald Higgs	118.5
5. Rudy Khuber	114.0

SCALE

Junior	Points
1. Michael Kuehne	103.0
2. Bruce Pallet	83.0
3. Michael Parykaza	78.3
4. Marty Thompson	77.5
5. Barry Pallet	72.5
Senior	
1. Daniel Domina	115.5
2. Terry Kuehne	103.5
3. Brian Webster	103■
4. Robert Hanford	102.0
Open	
1. Ronald Marcelet	172.5
2. Earl Thompson	160.5
3. James Richmond	154.7
4. Charles Sotich	151.0
5. Bucky Servaites	141.7



Bucky Servaites outflew others for the FF Category Championship as well ■ the Open and Grand National.

Size of Jim Richmond's Indoor Scale Pilatus Porter belies its airworthiness—did 3:23. Richmond was Indoor Champion.

Lowering lights helped indoor retrieval. Ed Stoll unhooks Paper Stick model here, placed 4th. Armory had good conditions.

■ most remarkable model was the Ford Tri-Motor Indoor Rubber Scale model by Fulton Hungerford. Won new St. Louis Award.

Left, Marty Thompson shows off the style which garnered for him the Junior National Championship. VTO launch is of his Torp 40-powered Stardust 900, the beginning of one of the flights which placed him first in Class C. Right, former AMA president C. O. Wright still competes vigorously in the Nats. FF Scale Antoinette launch shown.

Weighing Wakefield is Chris Matsuno. Pipe-mounted balance rig checks both total weight and rubber weight depending upon hook used.

Jetex exhaust goes through tubular pylon of Charles Monson's model. Vintage wing has "PAA" markings.

Original Class II FF model by Bob Combs has high thrust line, low rudder, big 45% stab, powered by Supertigre 29.

A number of Canadians entered the Nats, among them Link Thomas, left, winding for Unlimited Rubber, and Willard Thompson, right, with A-2 Towline Glider. Peter Allnutt, another Canadian, won A-2 Towline both this year and last.

FREE FLIGHT—Outdoor

½A GAS

Junior	Seconds
1 Stephen Klauss	540
2 Mark Kunmerow	[illegible]
3 Frank Wolff	525
4 Marty Thompson	[illegible]
5 Glen Winkel	458
Senior	
1 Grady Turner	[illegible]
2 Pat McGehe	484
3 Alan Hezelit	467
4 R. Robinson, Jr.	445
5 George Pharr, Jr.	440
Open	
1 Dennis Kargol	1080
2 Gilbert Robbins	730
3 Allan Vollmer	610
4 Vic Cunnyngham, Jr.	580
5 Jack Greene	570

II GAS

Junior	Seconds
1 Marty Thompson	1027
2 Randy Weller	880
3 Michael Taibi	685
4 Brian Pardue	599
5 Gerald Comp, Jr.	530
Senior	
1 Brian Webster	[illegible]
2 Howard McCarthy	[illegible]
3 Richard Lyons, Jr.	[illegible]
4 Mike Hallum	487
5 David Berquist	486
Open	
1 Andy DeMello	1200
2 William Wall	1236
3 Dennis Bronco	1200
4 Anthony Italiano	1173
5 Gerald Comp	1020

B GAS

Junior	Seconds
1 Marty Thompson	1080
2 Michael Taibi	662
3 Larry McFarland	445
4 Kevin Hayes	416
5 Roger Greene	406
Senior	
1 Gary Myers	720
2 Lewis Cleveland	695
3 Brian Webster	680
4 Gary Pipes	462
5 Joe Norcross	457
Open	
1 Larry Miller	900
2 James Messer	840
3 Vic Cunnyngham, Jr.	720
Andrew George	720
Bruce Hannah	720
Jack Bresnahan	720
4 John Pfeifer	710
5 Jim Hyde	665

C GAS

Junior	Seconds
1 Marty Thompson	1024
2 Kevin Hayes	676
3 John White	650
4 John Lorbiecki	607
5 Robert Butler	395
Senior	
1 Grady Turner	496
Brian Webster	496
2 Pat McGehe	[illegible]
3 Robert Hanford	479
4 Lewis Cleveland	472
5 Gary Myers	455
Open	
1 Frank Wolff	1031
2 Robert Billert	1013
3 Glenn Schantz	1002
4 William Wall	972
5 Charles Harper	900

FAI POWER

Junior	Seconds
1 James Haught	[illegible]
2 Michael Taibi	503
3 William Schlarb	406
4 Michael Kuehne	360
5 Marty Thompson	185
Senior	
1 Paul Andrade	791
2 Glen Poole	[illegible]
3 Lewis Cleveland	520
4 Terry Kuehne	182
Open	
1 Robert Watson	900
2 Andrew George	868
3 Thomas Hutchinson	860
4 Joe Beton	855
5 Rolland Anderson	834

WAKEFIELD RUBBER

Junior	Seconds
1 John Petchler	302
2 John Bennett	253
3 Michael Kuehne	70
4 Keith Gordey	49
Senior	
1 Jan Servaites	561
2 Mike Bailey	[illegible]
3 Robert Hanford	499
4 Richard Hixon	403
5 Terry Kuehne	388
Open	
1 Frank Heeb	790
2 Dale Wilson	760
3 Jack McGillivray	720
4 Urs Schaller	694
5 Willard Smitz	650

COUPE D'HIVER RUBBER

Junior-Senior	Seconds
1 John Petchler	492
2 Susan Weisenbach	421
3 Keith Gordey	261
4 Richard Hixon	258
5 Richard Pesch	228
Open	
1 Joseph Macay	539
II Richard Sherman	532
Larry Miller	532
III Bucky Servaites	522
IV James Richmond	521
V Charles Schobloher	519

UNLIMITED RUBBER

Junior	Seconds
1. Michael Taibi	437
2. Eric Ratschek	427
3. Peter Lewis	427
4. John Bennett	315
Thomas Dinelli	315
5. Gary Rungerford	298
Senior	
1. Mike Bailey	684
II. Paul Andrade	537
3. Gary Heeb	480
II. Donald Mackenzie	468
5. Brian Webster	444
Open	
1. Willard Smitz	2160
2. George Perryman	2118
3. Peter Allnutt	1260
4. Mike Thomas	1084
5. Sherman Ovelmen	717

HELICOPTER

Jr.-Sr.-Open	Points
1 Glenn Lee	149.00
2 Richard Werrel	126.06
3 Lee Taylor	105.00
4 William Ellerman	35.00

ROCKET POWER

Junior	Seconds
1 Charles Krickel	204
2 William Schlarb	187
3 James Haught	141
Charaine Moore	141
4 John Lorbiecki	110
5 Rod Wilson	109
Senior	
1 Denny Dock	302
2 John Castiglioni	230
3 Robert Hanford	152
4 Richard Lyons, Jr.	74
5 Joseph Dziallo	38
Open	
1 Don Chancey	410
2 Charles Markos	377
3 William Haught	378
4 Charles Rotich	340
5 James Greene	330

NORDIC GLIDER

A-1 Junior	Seconds
1. John Petchler	552
2 James McCarthy	524
3. Kenneth Bauer	466
4 Eric Ratschek	432
5. Barry Pallet	390
A-2 Junior	
1. Marty Thompson	767
2. Ron Weaver	669
3 John Lorbiecki	[illegible]
4 James Haught	636
5. Wayne Frichis	596
A-1/A-2 Senior	
1 Donald Mackenzie	773
2. George Pharr, Jr.	697
3 Susan Weisenbach	670
4. Gary Myers	641
5. Robert Hanford	579
A-1/A-2 Open	
1. Peter Allnutt	900
2. Phillip Bayly	[illegible]
3. Richard Mathis	842
4. Thomas Hutchinson	840
5 Phillip Kilmsworth	835

H.L. GLIDER

Junior	Seconds
1 David Uhoff	204
2 Robert Butler	221
3 Charles Krickel	179
George Hubschmidt	179
4. Tony Muckwlach	173
5. Robert Faranda	160
Senior	
1. Ronald Ganser	287
II. Grady Turner	280
III Denny Dock	271
II. George Pharr, Jr.	252
5. Terry Kuehne	210
Open	
1. Don Chancey	407
2. Richard Mathis	325
Charles Markos	325
3. Thomas Peadon	290
II. Frank Meek	287
5. Robert Watson	270

SCALE

Junior-Senior	Points
1. Michael Kuehne	911.0
Open	
1. Frederick Stark	550.5
2. Ronald Marteler	532.0
III. Robert Adair	518.5
4. Rudolph Stab	477.5
5. Bruno Markiewicz	451.0

AMA News Extra . . . . .

1970 CONTROL LINE WORLD CHAMPIONSHIPS

Terrific is a word which describes the kind of flying U.S. team members did in the Control Line World Championships at Namur, Belgium, August 19-23. Our competitors placed first both individually and as a team in Speed and Aerobatics. In Team Racing, Russia swept the field, although America's Theobald/Barr was close behind in fourth, and the team finished second. Word is that Albritton/Marvin likely would have qualified for the Final Race had their first flight not been disqualified for a passing infraction. The official results:

SPEED: 1st--U.S.A.; 2nd--Russia; 3rd--France

Pl.	Competitor	Country	1st	2nd	3rd	Best km/hr
1.	Arnold Nelson	U.S.A.	240.0	-	-	240.0
2.	Jim Nightingale	U.S.A.	218.1	238.4	235.2	235.2
3.	Jackson	Gt. Britain	229.2	227.8	229.2	229.2
4.	Dusi	Italy	-	225.0	225.0	225.0
5.	Glenn Lee	U.S.A.	225.0	198.8	223.6	225.0
6.	Rodzhers	Russia	210.5	220.8	219.5	220.8
7.	Wamper	E. Germany	216.8	220.8	218.1	220.8
8.	Volkov	Russia	210.5	218.1	220.8	220.8
9.	Burrus	W. Germany	220.8	-	209.3	220.8
10.	Jarry-Desloges	France	-	206.8	220.8	220.8

AEROBATICS: 1st--U.S.A.; 2nd--Czechoslovakia; 3rd--Italy

Pl.	Competitor	Country	1st	2nd	3rd	Total 2 Fl.
1.	Bill Werwage	U.S.A.	932	979	945	1,924
2.	Bob Gieske	U.S.A.	969	933	951	1,920
3.	Gabris	Czechoslovakia	877	951	946	1,897
4.	Gerald Phelps	U.S.A.	924	944	942	1,886
5.	Billon	France	875	935	911	1,846
6.	Cani	Czechoslovakia	929	893	859	1,822
7.	Compostella	Italy	877	903	904	1,807
8.	Anderson	Sweden	816	897	889	1,786
9.	Rossi	Italy	883	882	877	1,765
10.	Van Den Hout	Holland	855	888	877	1,765

TEAM RACING: 1st--Russia; 2nd--U.S.A.; 3rd--Great Britain

Pl.	Competitor	Country	1st Heat	2nd Heat	Final Race
1.	Babichev/Krasnorutsky	Russia	4:17.0	4:37.0	8:55.8
2.	Plotzinjsh/Timofeev	Russia	4:30.8	4:38.1	9:13.0
3.	Onufrienko/Shapovalov	Russia	4:53.0	4:27.7	d.n.f.
4.	Theobald/Barr	U.S.A.	4:35.5	4:45.8	
5.	Bader/Kaul	W. Germany	4:44.0	4:44.7	
6.	Sundell/Sundell	Finland	5:15.9	4:45.8	
7.	Metkmeyer/Metkemeyer	N.L.	disq.	4:46.4	
8.	Schwarz/Ilg	W. Germany	5:10.9	4:47.1	
9.	Gurtler/Baumgartner	Austria	disq.	4:47.2	
10.	Magli/Ferroni	Italy	4:49.5	disq.	
18.	Albritton/Marvin	U.S.A.	disq.	5:00.4	
21.	Wright/Dunkin	U.S.A.	5:05.5	5:13.3	

By special arrangement with the publisher this page is produced at the very last minute, just before the magazine is printed, to bring you the latest news concerning current Academy of Model Aeronautics events of national significance.

1970 Nats

(Continued from page 47)

—the other B-36 entrant) also showed everyone how to start engines. They consistently started all six engines [redacted] each plane in a minute or less, in contrast to some single engine entrants who missed [redacted] turn when they couldn't get started within three minutes.

Interesting complaint from some RC Scale contestants: they hardly had time to clean up and refuel after one flight before being called up for the next.

RC Pattern contestants were generally happy about how their part of the Nats ran. D Pattern (FAI) contestants got eight rounds of qualification flying in, plus six rounds in the finals; A and B Pattern flyers got four rounds.

The shared-time concept for Nats RC, originated by **Ed Shipe** (Santa Barbara, Calif.), was developed in detail by the overall RC Director. See the July 1970 issue. It proved to be all that was promised, making possible the flying of Pattern, Scale and Pylon Racing on two days instead of three days, thus permitting the addition of A and [redacted] Pattern to this year's Nats.

Another innovation for Nats RC was the use of grandstands for Pattern and Pylon Finals' spectators. It was particularly beneficial for those viewing the climaxing four hours of Pylon flying. Extremely close races, a good view, and loudspeaker commentary provided [redacted] tremendous degree of excitement that had cheering sections roaring constantly. The Pylon event officials did a great job of keeping the action moving constantly.

It was the greatest RC Nats yet, according to both contestants and officials. The main point seemed to be that everyone got a fair shake—that despite the minor inequities that plague any large meet, there was enough flying available to fairly determine the winners. A common remark among the losers was that they couldn't blame the system this year.

Outdoor Free Flight benefited from one major improvement over previous Nats. For the first time in many years the same crew of officials worked all the events, in contrast to the past when different event directors were used every day. As a result the FF events quickly shook down to smooth and consistent operation.

Elimination of the first flight by noon rule of previous Nats proved to be [redacted] good thing, substituted for by a sharp event cutoff time. Fear of getting caught by the latter was effective in avoiding late jams which had been the original cause of instituting the noon rule in other years.

Free Flight, as usual, had the most contestants per event. Ten events had over a hundred entries each, and the three largest had much more: ½A Gas and HL Glider had over 300, A Gas and Nordic Glider had over 200. Coupe D'Hiver, a brand new event for this year's Nats, drew 103 entries.

Scoreboard-type posting of results in all Free Flight events also contributed to contestant satisfaction. Entrants could view all standings at any time, so avoided was much confusion, uncertainty, and questioning of officials.

AMA HQ developed the special scoreboards which also doubled as event master records. As a result of the Nats success they are being made available to all Contest Directors for general meet use—they are suitable for all categories of competition. Write to HQ for a sample and prices.

Safety was greatly increased in Free Flight at the 1970 Nats. Despite many years of previous trying, it has always been difficult to get cars parked upwind of the launching area. This year the effort was successful, aided by winds which generally were consistent in direction and also by officials who kept tighter rein on permissible launching areas.

Indoor had two good days of flying in near perfect draft-free air. As a result, despite [redacted] somewhat less than ideal site, performances were excellent. The topper was **Jim Richmond**'s 34 minute, 33 second flight in the Indoor Stick event—a fabulous achievement in a building with less than 100 feet in ceiling height. Richmond also placed first in three of the five events to become the Indoor Category Champion.

Indoor also had some great hand-launched glider performances, with three entrants averaging over one minute. Open class entrant **Dennis Bronco**, (Lakewood, Calif.) came out on top with a two-flight total of 128.6 seconds, but Junior Champ **Marty Thompson** (Livermore, Calif.) was close behind with 118.2 seconds.

An incredible Ford Tri-Motor Indoor Scale model by **Fulton Hungerford** (Titusville, Fla.) had everyone amazed. Weighing only an ounce, it lacked nothing in detail, including corrugated covering. Its three props were driven by three rubber motors, one in the fuselage and the others spanwise in the wing. Only about a foot in span, the model had true scale construction inside and out —probably the most magnificent example of craftsmanship at the Nats. Its only weakness was in flying performance; otherwise it stole the show.

Another unique Indoor model was the 42" Stick entry of **Ron Plotzke** (Mt. Clemens, Mich.). This huge but graceful microfilm-covered model placed third with a flight of over [redacted] minutes. It was an outstanding example of intricate cross-trussing and delicate construction techniques.

Control Line performances were dominated by the CL Category Champion **Danny Bartley** (High Point, N.C.). Although a Senior age contestant, he beat out many adults, placing in eight events and taking five first places. His nearest competition was over 100 points behind in the Category Championship race.

Scale Racing, better known [redacted] Goodyear, proved to be extremely popular in its first Nats appearance on the official event schedule. With 119 contestants, the event had to have [redacted] second circle added in order to get all the flights in. Open winner **John Burnhart** (Chicago, Ill.) was the top placer with [redacted] time of 7 minutes, 36 seconds.

Combat, as in '69, was [redacted] extremely crowded event with 157 entries, which took every bit of time available to run off, especially in the Open age category which had 84 contestants. Past Nats experience of officials paid off in a smooth running event despite extreme pressure —only minor complaints and disputes were involved in what is always the most violently contested event at the Nats.

C Speed produced the fastest times of all Nats events, even topping Jet Speed. There were four C Speed flights of over 180 mph, led by the **Roselle-Frye** team (Dayton, Ohio) performance of 189.40. Young **Danny Bartley** stayed right near them, however, by recording the top Senior C Speed flight of over 186 mph.

Control Line Stunt was treated to some new techniques in judging and event organization. Navy personnel were greatly impressed by the training session in which they were given judging instructions—a naval aviator on the scene remarked that the training was equivalent or superior to military flight instruction. It all paid off, as there were 93 contestants entered.

Carrier events also had more than a hundred contestants to contend with—57 in Profile Carrier alone. Unfortunately, the circle layout was arranged for two carrier decks, and when a third had to be utilized due to the numbers involved, there was an awkward model and line processing arrangement which drew complaints. Otherwise the event proceeded smoothly.

Bucky Servaites (Dayton, Ohio) was again Grand and Open National Champion this year, as in '69. He also took home the new Free Flight Category Champion trophy. Bucky was the only one competing for Individual Champ who topped 800 points; the next three nearest were in the 700's.

Larry Leonard (Northridge, Calif.) is the 1970 Radio Control Category Champion, repeating his 1969 performance. He was up against tougher competition

(Continued on page 80)

Indoor Modelers—want results of the December CIAM meeting (with possible rule changes) in a hurry? Send stamped, pre-addressed envelope with request for same to AMA HQ—will be mailed as soon after the meeting as possible.

CONTEST CALENDAR

Official Sanctioned Contests of the Academy of Model Aeronautics

Oct. 3-4—Tulsa, Okla. (AA) RC Formula Gala Meet. Site: Glue Dobbers Field. W. Saltlow CD, Rt. #1, Box 180-C, Coweta, Okla. 74429. Sponsor: **Tulsa Glue Dobbers, Inc.**

Oct. 3-4—Montevallo, Ala. (AA) Birmingham RC Contest. Site: "X" Ranch Field. E. Riley CD, 1924 2nd Pl., N.W., Birmingham, Ala. 35215. Sponsor: **Birmingham Radio Control Club.**

Oct. 3-4—Santee, S.C. (A) Wings & Wheels RC Database. Site: Wings & Wheels Museum. R. Thompson CD, P.O. Box 621, Sumter, S.C. 29150.

Oct. 3-4—Sebring, Fla. (AA) Hurricane FF & CL Meet. Site: Sebring Airport. R. Fritz CD, 3812 Pelican Ln., Orlando, Fla. 32803.

Oct. 3-4—Jamestown, N.Y. (AA) United RC Pylon Racing Circuit Championships. Site: Winch Rd., Lakewood, N.Y. H. DeRolf CD, 3833 Harlem Rd., Buffalo, N.Y. 14215.

Oct. 3-4—Amarillo, Tex. (AA) ARKS 10th Annual RC Contest. Site: Club Flying Field. B. Irwin CD, 3302 Lewis Ln., Amarillo, Tex. 79109. Sponsor: **Amarillo Radio Kontrol Society.**

Oct. 4—Arlington, Tex. (AA) Ft. Worth Plainesmen Fall Annual FF Meet. Site: Arlington. C. Davis CD, 7612 Sybil Dr., Ft. Worth, Tex. 76118. Sponsor: **Ft. Worth Plainesmen.**

Oct. 4—Dayton, Ohio (AA) Cold Cash CL Bash. Site: Municipal Model Flying Field. H. Roe CD, 165 Broadripple Rd., Centerville, Ohio 45459. Sponsor: **Dayton Buzzin' Buzzards.**

Oct. 4—Pittstown, N.J. (AA) Central Jersey 1970 Eastern States RC Championships. Site: Sky-Manor Airport. L. Shulman CD, 42 Blake Ave., Cranford, N.J. 07016. Sponsor: **Central Jersey Radio Control Club.**

Oct. 4—Watsonville, Calif. (A) RC Bee's Santa Cruz County RC Meet. Site: Peterson Ranch. W. Pritchard CD, 9 Debbie Ct., Boulder Creek, Calif. 95006. Sponsor: [redacted] **Bee's**

Oct. 4—Lincoln Park, N.J. (AA) 12th Annual CL Model Air Show. Site: GSCB Club Field. E. Dickson CD, 36 Vreeland Ave., Clifton, N.J. 07011. Sponsor: **Garden State Circle Burners, Inc.**

(Continued on page 79)

Havoc

(Continued from page 41)

rop P-61 Black Widow, the first American airplane designed strictly for night fighting. Some later model P-70A's got into combat in the Pacific, but most were limited to training activities.

Considerable interest was shown in developing [redacted] photoreconnaissance version of the A-20. With the addition of camera equipment and a variety of experimental combinations of machine guns, three were tested as XF-3 and YF-3 in 1940. Then [redacted] reconnaissance version of the A-20B, to be called the 0-53, was planned. No fewer than 1489 were ordered, but the idea was dropped before any were built. Finally, in 1944, the F-3 program saw 46 A-20J's and A-20K's modified into F-3A's.

The U.S. Navy got into the act, briefly and unsuccessfully. Between one and four A-20A's were turned over to the Navy to be tested as BD-1's. An additional eight A-20B's became the Navy's BD-2, but none of them advanced beyond the research and development stage. The BD-1 designation reappeared [redacted] the early 1960's on the prototype light plane designed by Jim Bede and eventually marketed [redacted] the American "Yankee." Obviously, this was just a coincidence.

Of all the interesting variations of this Douglas airplane, the A-20G was the really important model, accounting for almost 40% of the total production. They all had the 1600-hp Wright R-2600-11 engines, but armament differed considerably. The A-20G-1 had four 20-mm cannon and two .50-cal. machine guns in the nose, a .30 [redacted] .50 cal. machine gun alongside the nose, and [redacted] .50 cal. in the [redacted] cockpit. Later, the four cannon were replaced by four more .50 cal. machine guns. Wing racks for up to 2000 lbs. of bombs were installed on the -20 and subsequent versions, along with [redacted] new power-driven rear top turret having two .50-cal. machine guns.

By the time the final A-20K was delivered to the USAAF in September 1944, [redacted] total of 7385 had been built. And, while it [redacted] the end of the line for one proud airplane, it [redacted] the beginning for its successor, the Douglas A-26 Invader. The newcomer [redacted] larger, faster and packed [redacted] greater wallop, but it was unmistakably the big brother of the Havoc, and [redacted] its achievements in the closing months of World War II and in the Korean Conflict [redacted] more than slightly related to the history of the A-20.

What remains of the A-20 after all these years, besides memories? As far as can be determined, the only one left in recognizable shape is [redacted] A-20G (S/N 322200), properly restored and parked in the outdoor display area of the USAF Museum at Wright-Patterson AFB, Ohio, alongside its brothers-in-arms.

Year of the Retractables

(Continued from page 25)

found in modern digital servos and have capacitor noise suppression. They come wired to connectors, ready for use. MK also offers an amplifier for driving servos direct from the receiver, and an SPDT switch which may be triggered from throttle linkage. Servo operation is quiet and smooth, and gears rise in about two sec.

THE NEVER FAIL RLG is pneumatic and operates from a tap on the engine cranckcase. Gear units are built on sturdy aluminum frames, pistons are spring-loaded to assure dropping wheels if the engine stops, and all gears lock both up and down. Nose gear is steerable and designed for horizontal mounting. The system operated [redacted] five-lb. pressure. Operation is quite fast going up, virtually instantaneous going down. Units are mostly metal, but most metal-to-metal contact is eliminated.

THE P.M.W. SYSTEM is well thought out, neatly made, and light in weight. The 2" [redacted] cartridge (¾" dia.) is held by a nylon clip and is easily removed for refill. This cartridge is connected to the valve's power ram unit by 11" of tiny metal tubing. Ram movement is about ⅞" maximum.

A large can of Freon comes with these units, plus a valve which screws on the can. It takes only a few minutes to fill the cartridge from this large can—a simple procedure. The makers claim 25 operations per cartridge filling. The single power ram is intended to operate all the RLG units on a plane. The valve on the power ram assembly takes only an ounce or two to move, and movement is about 3/16".

Two styles of P.M.W. wing gears are made, one (PR-1) pulls the gear up spanwise, as would be needed on a P-51. The PR-2 folds the gear chordwise, as well as rotating the wheel and strut so the wheel fits into its well, as in the P-40. The two units are quite different in construction and action. The PR-1 is based upon specially-bent torsion bars

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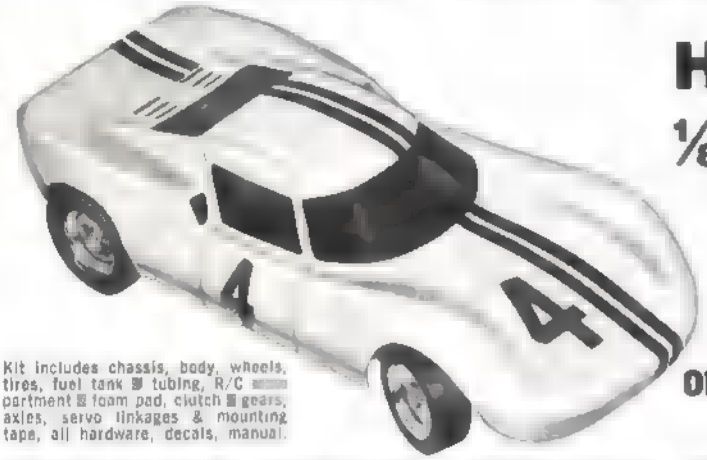

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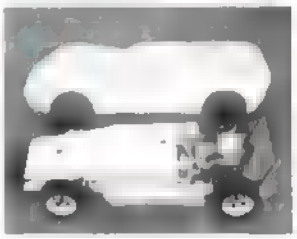

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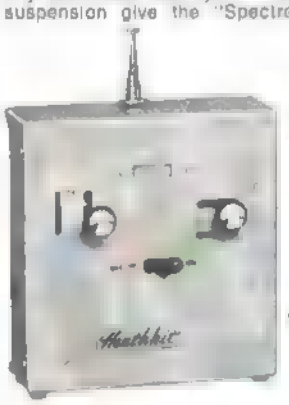

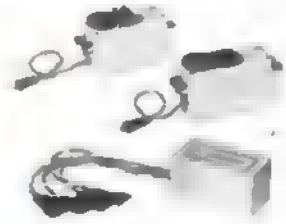

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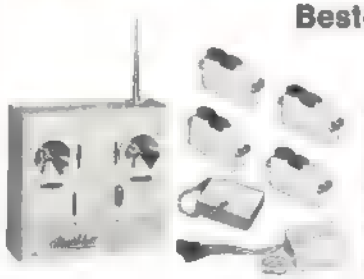
Kit GD-57, transmitter, receiver, 3 servos, batteries, charging cord, switches & soldering iron, (specify, 27 MHz, 53 MHz, or 72 MHz — 72 for planes only), 11 lbs. **$129.95***
Kit GDA-57-1, transmitter, battery, charging cord, (specify freq. desired) 3 lbs. **$54.95***
Kit GDA-57-2, receiver only, (specify freq.) 1 lb. **$34.95***
Kit GDA-19-4, 1 servo, 1 lb. **$21.50***



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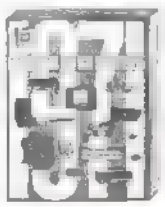

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that fit into hardwood holders like fixed LG legs. The outer end of each bar wire (wires and struts are 5/32" music wire) is bent to form a pivot point for the molded plastic piece which carries the wire wheel strut; the latter is fastened with two Allen-head setscrews.

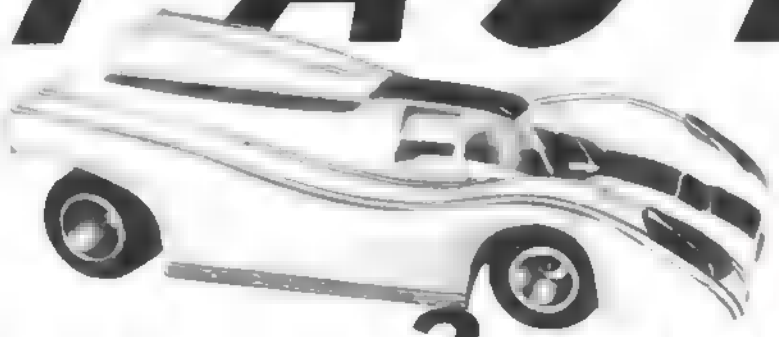
Operating links are of 3/32" music wire, furnished in two lengths for each side of the wing, with a coupler, so the length can be adjusted to the setup. Couplers then join the smaller wire halves permanently by soldering. A heavy bellcrank formed from 3/32" thick fiberglass-epoxy sheet is pivoted at the center of the wing; one operating link goes in each "ear" of the bellcrank, another link goes to the servo or power unit. The operating links are so arranged that the gears lock when down—link pivot points in the arm in line with bellcrank pivot. When retracted the gears do not lock, so they must be held in this position by the servo or power unit. Wheels should retract toward the center of the wing.

The P.M.W. PR-2 units come mounted on plates of ⅛" thick ply, measuring 2½ x 6". These plates are attached to the wing's underside and spaced chordwise to allow room for chordwise retraction and a wheel well. The torsion-bar system is utilized. A guide rod must be soldered to the upper end of each strut. Strut and wheel are rotated 90 degrees as the gear moves up down. The mechanism locks with wheels extended. Operating rods from each wing unit—units are made in right and left—join at wing center with the combined coupler and control horn. Necessary hardware is furnished for both types.

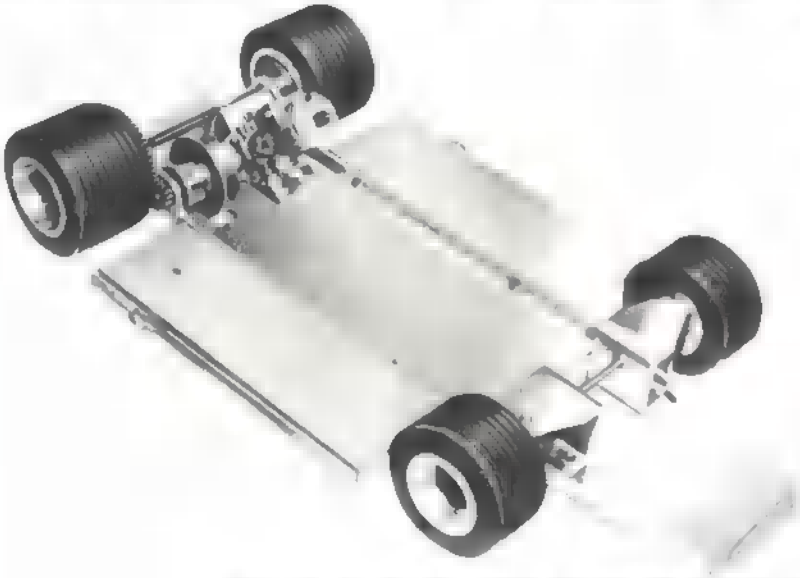
PR-1 units have no metal-to-metal joints; the PR-2 system has several. Plastic bushings are used at other points for isolation to prevent extended runs of metal parts from one wing to other. Rugged and quite simple in design and construction, these units have no spring compensation, so fairly potent operating sources are required.

ROWAN GAS-OPERATED system from Germany includes three quite similar wheel units, a small valve and a bottle of gas. Makers claim 60 to 70 system operations from one tank. Units are interconnected with tough plastic tubing, about 5/32" dia., and screw-on fittings. LG units are extremely simple with few parts; the nose gear unit differs only in having an attached aluminum bracket with linkage provisions for steering. Wheel legs are locked in down, but held up only by pressure; a spring in the cylinder forces gear down. All legs are easily adjustable for length and bent for wheels. Gas tank measures about 6" long and 1⅝" dia.

FASTER THAN FAST!



CHOICE OF 2 NEW DYNAMIC R/C KITS



AND AN INCOMPARABLE NEW R/C CHASSIS!

We're all excited about our new R/C chassis . . . **never having seen anything faster** in its field. It defies competition! Simple but rugged in construction, the chassis is ⅛" thick draw formed aluminum. Edges are rolled. It features:

- **STRONGEST FRONT SUSPENSION EVER OFFERED**
- **ADJUSTABLE CAMBER & KING PIN TILT**
- **POWER DERIVED THRU CENTRIFUGAL CLUTCH ATTACHED TO FLYWHEEL**
- **5 TO 1 GEAR RATIO—achieved thru a 12 tooth precision machined aluminum 24P spur gear and a 12 tooth precision machined steel pinion gear.**
- **BOTH GEARS INSURED AGAINST SLIPPAGE—shaft position firmly fixed in the chassis**
- **MAXIMUM TRACTION—new molded contour spo[redacted] tires with controlled cell structure, on aluminum wheels**
- **MINIMUM MAINTENANCE**

Top this *"faster than fast"* chassis with one of our new DYNAMIC super detailed, crystal clear .060 Butyrate bodies and you'll have the ultimate in an R/C race car . . . *at a price you won't believe!!!*

#200 STP-T500 INDY KIT. Complete with chassis, adjustable front suspension, flywheel-clutch, tires, wheels, engine bracket, 5:1 gear set, (steel pinion), body, hardware

*Does not include engine.

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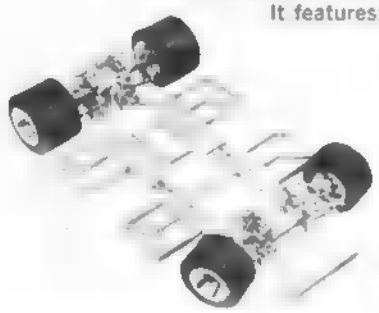
#201 PORSCHE 917 COUPE KIT. Complete with chassis, outriggers, adjustable front suspension, engine bracket, flywheel-clutch, tires, wheels, body, hardware

$59.95*

Also available

Deluxe R/C RACE CAR KIT

The first complete ⅛ Scale ALL METAL KIT



It features:

- Durable diecast aluminum alloy chassis
- Screw driver [redacted] wrench assembly
- Countless means of modification . . . tap, drill, saw, [redacted] polish
- Vibration-free operation
- Torque converter (transmission)—acts as clutch and brake
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#100 DELUXE McLAREN MK8A KIT (sport) Complete kit with chassis, torque converter, wheels, tires, outriggers, spring shocks, body, hdwe.*

$127.50*

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$119.95*

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Increased Performance with **DYNAMIC'S NEW GOLDEN-GLO GLASS SEAL GLOW PLUG**

Glass Seal and heavy Platinum Alloy Coil combine to make DYNAMIC Long Reach Glow Plugs the most durable and best performing glow plugs available.

- 3 to 5% [redacted] More R.P.M.
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- Tough and Reliable
- Longer Life
- No Shorting
- No Sag
- Spear Point Post
- No Leakage—tested at 35,000 P.S.I.

LONG REACH Regular 98¢ LONG REACH R/C $1.59

Dynamic MODELS 13309 SATICOY [redacted] • NO. HOLLYWOOD, CALIFORNIA 91605

Nelson Model Products (Rowan's distributor) can supply refilling valve for use with standard can of Freon, purchased locally. Valve assembly will cost about $4; cans of Freon, $2.

WING POSI-TRACT UNITS are the only present ones to have a built-in electric motor. Practically the same unit is used for both nose and wing positions. Nose gear may be mounted either horizontally or vertically and is fully steerable. The new Olympic units require only two wires to each gear and have two simple SPDT switches for operation. All gears operate together, but each has built-in limit switches, as well as capacitor and RF choke suppression of electrical noise. They work on 3.6V (not center-tapped). They require about ten sec. to retract, current running 200 to 350 ma. Several styles of 5/32" dia. wheel legs are available. Plastic dust covers are offered at extra cost. Units lock in any position because of the style of gearing used. Apparently, the maker feels it is sufficiently rugged to take inevitable abuse. Units are mostly plastic, including all gears except motor pinion.

CAS GEAR UNITS operate much on the same principles as the KDH (see Fig. 3), all-metal and spring-loaded so that extra-powerful servos are not required. They are compact and have smooth action. Main gear legs do not have shock-absorbing coils in the wire, but the nose gear has five-turn shock coil. All legs are easily replaceable by loosening setscrew. A single ordinary servo (no special 180-degree servo needed) will operate an entire trike gear setup. With spring assist and smooth action, this seems possible. About 11/16" thrust movement is required for operation. Spring tension is easily adjustable for different wheel weights and a simple ingenious mounting scheme is included. With each gear comes a plate of 3/16" ply—7½ x 3½" for main gear units, 7½ x 2½" for nose gear. Plates are printed for RLG unit mounting holes and for cutout to clear retracted gear leg and wheels. Holes for wheels of 2¾" to 3" dia. are indicated.

RMK SPECIAL GEAR UNITS are intended to operate from RMK special rotary servos, but can be handled by any other adequately powerful servo. Units are not spring-loaded, so one servo for nose gear and one for two wing units are probably mandatory. Although from the same maker, they are entirely different in appearance and design from other MK units reviewed. RMK special units also operate on the principle shown in Fig. 3.

Main gear units have single 5/32" music wire leg with three-turn shock

coil. Nose gears have dual [illegible]" wire legs, with four-turn coil in each leg. Main gear legs are easily replaced by removing screw. Nose wires straight as received, length adjusted to suit when axle parts assembled. Nose gear designed to mount on the firewall's back surface. Leg is steerable. Units are mainly metal; the few plastic parts used eliminate metal-to-metal contacts. Connections to operating and to steering pushrods are plastic. Servo movement required is [illegible] to ¾", depending upon the hole used in operating arm. Since gears lock both up and down, a 180-degree servo is not necessary, but a strong servo is important.

References

(1) RC Piper Comanche. Ralph Jackson. May/June AM, p. 13.
(2) UC scale B-17G. Laumer Simmance. July Aug. 1963 AM, p. 17.
(3) Pictures, data on UC P-38 system. Ogden. May 1967 AM, p.
(4) Data on Centrak RLG in UC plane. AM Annual for 1965.
(5) Data on Centrak UC plane. 1967 AM, p. 23.
(6) Pneumatic system for RC plane. Dale Root. Jan./Feb. 1966 AM, p. 14.
(7) Pneumatic RLG system for UC Stunter. Harold Price. Jan./Feb. 1964 AM, p. 36.
(8) Bill Bertrand's RLG March AM, p. 64.
(9) Modifications to RLG units. Martin Dietrich. June 1968 AAM, p. 30.

On the Scene

(Continued from page 12)

smooth operation with minimum delay between flights. Finalists D N & E, using a full pattern, competed on Sunday.

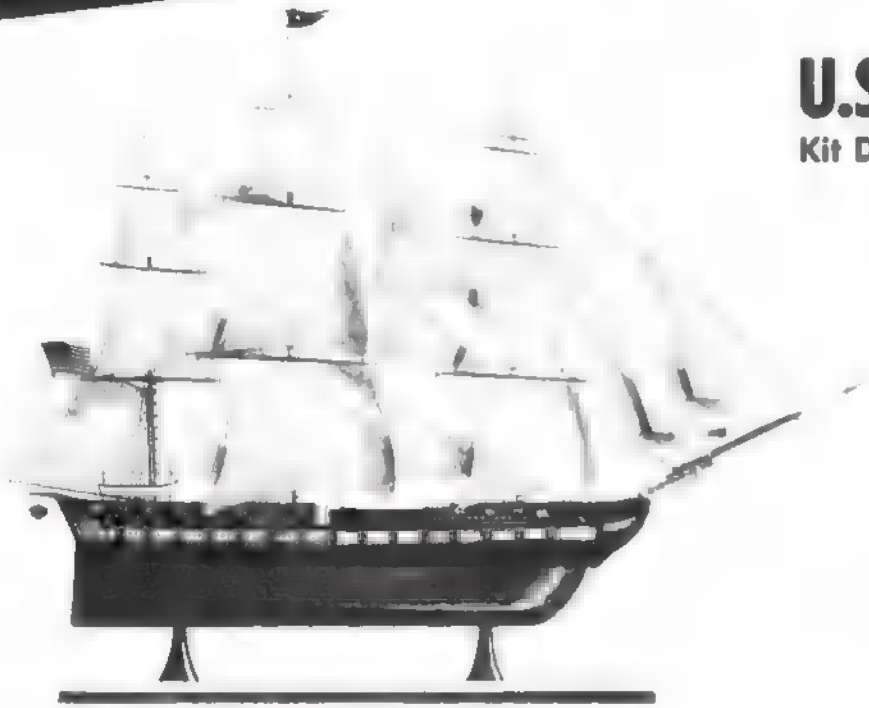
Among the 13 entries in Scale was Ken Drummond's six-engine B-36 which had to be seen to be believed. And it flew beautifully! The racing events drew 27 contestants in Formula 1, nine in FAI Pylon, and 25 in Sport Pylon. Extremely trying wind conditions kept times down and mortality high.

Perhaps the most gratifying event was FAI Pylon, conducted under the FAI provisional rules. Standard 25/75 fuel (Zero Nitro) used and mufflers were required. Despite high winds, Harold deBolt had the fastest heat of 2:18; which is competitive by any standards. His opinion was: "This is a heck of a good event if they could only get rid of the blankety-blank mufflers!" However, to the sound beautiful, and the ships even look faster when they are quiet. Zero Nitro sure does save the finish and dollars.

Winners in the events were as follows: Class A Jr./Sr., James Carlson; Class A Open, Donald Love; Class B, Ted Berman; Class D Novice, M. C. Reed; Class D Expert, Ed Keck. Also: Scale, H. Vandiver; Formula I, Marvin Kowalewski; FAI Pylon, Maurice Woods; Sport Pylon, Dave Penry; and Biplane Pattern, Dave Corven. As is customary, a Grand Champion was crowned. Marvin Kowalewski took that honor with a win in Formula I and places in FAI and Sport Pylon. Meet you here next month!

BETTER DETAIL!

NE



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With Fine Quality Cloth Sails

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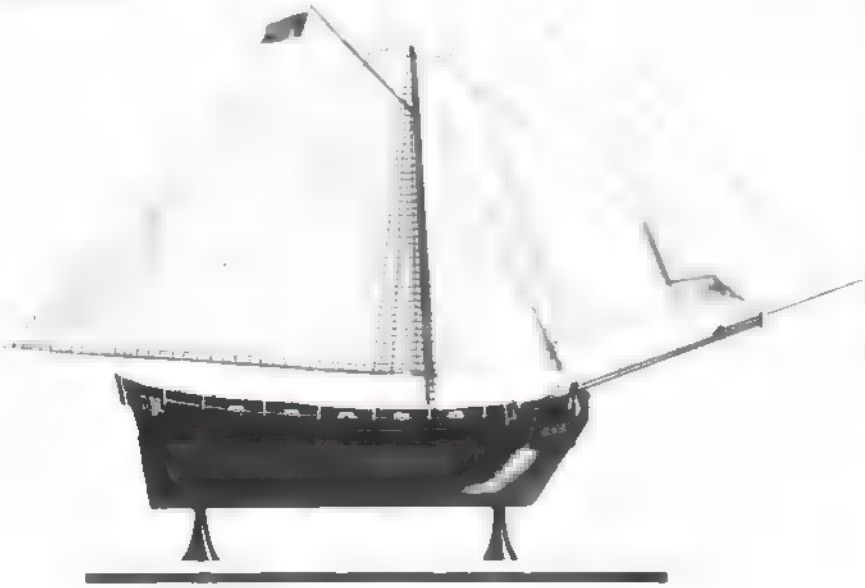

The use of hardwood throughout, insures an heirloom permanency that will last for generations — Carved hardwood hulls — Planking grooves printed into decks — Tapered birch masts and yards — Miniature rope for rigging in different sizes and colors — Complete hardware pack contains dozens of cast metal fittings — Many finished hardwood parts (as req.) Brass Chain (as req.) Authentic decals — Fine mahogany display base with mounting pedestals and hardware — Plans completely illustrated and detailed in step-by-step fashion, showing every "secret" method of easy mast construction and rigging — etc., etc.

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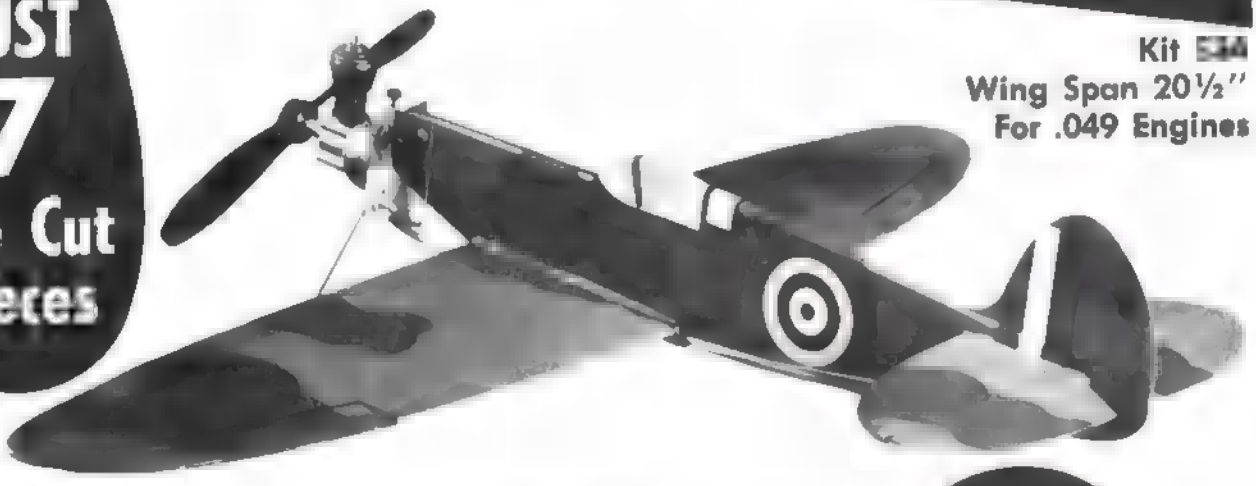
Kit D8 — Length 15½" **9.95**

BETTER FLYING!

JUST 7 Die Cut Pieces



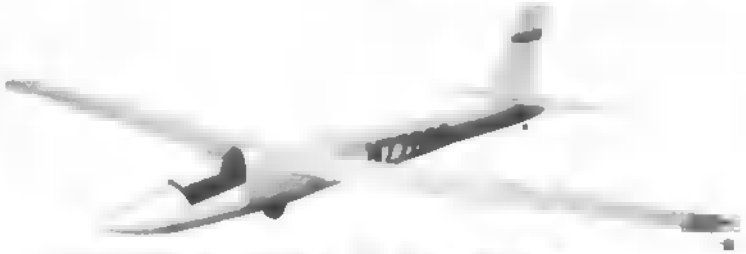
Kit [illegible]
Wing Span 20½"
For .049 Engines

The world-famous World War II Fighter — now amazingly simplified for beginners! Die-cut balsa wing and tail makes assembly just a matter of minutes! NO TISSUE COVERING! Engine and control system installation now a snap for anyone because this kit includes Aluminum motor mounts, Bell crank and Elevator horn — as well as finished Landing gear, Wheels, British Royal Air Force insignia and assorted Hardware. Plans and instruction are simple and complete.

2.95

and it does EVERY STUNT in the book

BEGINNERS SPITFIRE CONTROL LINE KIT

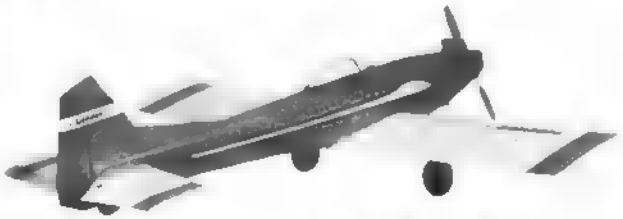


SCHWEIZER SGS 1-34 SAILPLANE

$23.95

[illegible] PS-26 Span 6 ft. 2½ in. Area 615 Sq. in. Wgt. 2¼ lbs. (less R/C) Scale 2 in = 1 ft.

CAN BE FLOWN WITH SINGLE CHANNEL THRU FULL HOUSE R/C



LANCER Advanced R/C Stunt Trainer

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Kit PS-25 — Span 53½". Area 525 sq. in. Wgt. 3¾ lbs. (less R/C). Engine .35 to .51

[illegible] AND [illegible] RESPONSIVE [illegible]

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Length 49½" Beam 10¾" Height 40"

OPERATES RUDDER-ONLY ON SINGLE CHANNEL OR FULL HOUSE [illegible] SAILS [illegible]

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- ☐ Catalog of entire line of airplane control line model kits, R/C scale and Trainer kits, boat model kits, accessories; etc. 10c enclosed.
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Name_____

Address_____ City_____ State_____ Zip_____

Smith on C/L

(Continued from page 35)

engine size and line length. (Line length [illegible] AMA requires. See list [illegible] end of rules.)

(7) Takeoffs score one to five points, landings score one [illegible] points. (8) Blue zone scores 20 points; white zone, 15 points; red zone, ten points. (9) All laps must be in selected color zone to score points. (10) Failure to stay in selected color zone is [illegible] attempt. (11) Three attempts allowed for three official flights. (12) Speed points are mph minus engine displacement.

(13) Models may score up to 105 points for workmanship. CD's [illegible] [illegible] [illegible] point system to judge static (appearance) points. (14) Landing gear and canopy are required. (15) Motor run is not to exceed four minutes. (16) No pressure fuel systems [illegible] allowed. (17) No single line control system may be used.

[illegible] Classes (Junior only)	Engine Size	Line Length	No. of Laps
½A	to .050	[illegible]	6
[illegible]	.051-.19	52' 6"	[illegible]
B	.19-.36	[illegible]	7
C	.401-.650	70'	[illegible]

Seniors and Open: Same [illegible] above with the following changes: ½A line length is 42 ft. and trimmed for five laps.

Class A: up to .1526 cu. in.; Class [illegible]: .1526-.300; Class C: .301-.650.

Well, there it is. [illegible] few dollars for [illegible] pylon and [illegible] fun event is all set. To add interest, have contestants fly in several different color zones in each flight. For example: two laps red, two laps blue, and finish with two laps in the white zone. Or get the hot-shot stunt fliers out and have them fly some laps upright, then some inverted or, for real skill, have them loop with the bottom of the loops cutting through a preselected color zone. The last should separate the men from the boys! While originally set up as [illegible] Sportsman Race, this event's possibilities [illegible] endless. Just be [illegible] to have enough hardware for the winners. That first trophy can [illegible] mighty exciting for [illegible] Junior in his first contest.

This would be an ideal event for an after-hours activity at the Nats. [illegible] should be a natural step up from the Delta Dart program. Literally tens of thousands of Ready-to-Fly models are sold each year, but no competition events are open to them. Prizes can be trophies for the first three and Certificates of Participation for all other contestants. These certificates [illegible] be inexpensive. How about the HIAA having them printed up and distributing them through the AMA to CD's who then could run such [illegible] event along with their scheduled program? This should bring out the Juniors. . . .

Drill Straight Holes: A quickie drill jig can be used to drill true holes in speed pans. Keeping the top mounting surface flat so engine and tie-down holes can be drilled is difficult. This jig solves the problem. To use, simply hold the pan against the top bar with [illegible] wedge inserted between jig and pan. Make [illegible] the jig is screwed and glued together and all parts [illegible] square. Surface the pan top before drilling. . . .

Engine Care: Keep engines clean during the winter months by removing them from the airplanes and washing them out to make [illegible] [illegible] dirt is in them. After cleaning, coat all moving parts with a light film of oil and wrap in a clean cloth. Check models for broken joints, bad hinges, and general condition. It's a lot easier to [illegible] repair work [illegible] than [illegible] wait until next spring. Also, by waiting, repairs may be done in a hurry and some important job skipped over. The result will be an unsafe model.

McEntee on R/C

(Continued from page 33)

Calif. (near San Francisco), the services of a large computer in Los Angeles [illegible] utilized to tabulate [illegible] and record the order of winners for the three different events run in the two-day meet. [illegible] direct phone tie-line was used by Phil Simpson (an avid modeler and glider flier, also an engineer with Pacific Tel. & Tel.), who was in charge of data processing and handling. These facilities were available through General Electric Computer Time-Sharing Service. The computer also kept track of contestant registration and [illegible] frequency allocations. . . .

Thermal Detection: While more fortunate glider fliers may utilize thermal sniffers to show when their craft are in rising currents, [illegible] much simpler and cheaper method has been devised. [illegible] Godden, who flies [illegible] simple rudder-only glider off [illegible] local hill, occasionally had been able to pick up [illegible] slope "wave," but it usually [illegible] elusive. He then resorted [illegible] "Magic Bubble" liquid from the five-and-ten. By dipping the furnished wand in the liquid and swishing it through the air, [illegible] long stream of bubbles forms and shows what really is going [illegible] in the nearby air! . . .

Current Glider Kits—the Kurwi Universal 68: Latest [illegible] the line of highly successful RC gliders, the Universal 68 can be built with many variations. With [illegible] fiberglass fuselage, the model weighs 12 ozs. and is about four and one-half feet long. Its characteristic long tail moment may be [illegible] [illegible] the Kurwi is extremely stable and docile in flight. All wing wood is full length, including sheet, strips and hardwood spars. Standard wingspan is 115 in., but plans indicate it [illegible] be enlarged to [illegible] 139 in. As with earlier Kurwi's, wing and stab halves are held on by a

tongue and box system.

The plans show rib shapes for Eppler 385 (good for thermal flying) and Eppler 387 (a high-speed foil for slope flying). Also shown is ■ flying tail and conventional stab-elevator setup. The full-size plans come with English instructions, translated by Keith Brewster. The glider will weigh around three lbs. with light equipment for R and E, and Mono Kote covering. The kit costs $50, and definitely is not for the inexperienced builder.

McCullough on R/C

(Continued from page 33)

engine conks out. Takeoffs and slow flight ■ impressive and touchdowns ■ easily made nose high on the main gear. Soon to fly is a ten ft. six in. Twin Porter with an even lighter wing loading.

His opinion is that only WW I or similar simple construction types with high lift sections can be built small and still deliver flights at the scale speeds now demanded by judges. The only way that modern prototypes can accomplish this is to go larger and lighter. . . .

A New Wrinkle: Check the local radio parts supply or a mail order catalog for ■ aerosol paint called Wrinkle Finish Spray-O-Namel. For use ■ wood or metal, it gives a fine-textured crackle surface for authentic reproduction of instrument panels. A can should last a whole club for several seasons. . . .

Books For Scale Modelers: Historical Aviation Album No. 8 (HAA, Box 33, Temple City, Calif. 91780. $5.00.), the latest volume in Paul Matt's epic series, is now available. Color plates have been added but the main items of interest still are the beautiful, clear 3-views. This time they include the Waco UPF-7, Laird Super Solution and the Timm Collegiate. If you ■ tired of plain old winged things, check the Vought XF5U-1 Flying Flapjack. Nasty!

Note that all of the Matt drawings which have appeared in the HAA series, in Aero Album quarterly, and in previous issues of AAM, over 75 in all, are available in double-size 17" x 22" blueprints for 75 cents a sheet. These enlargements ■ a treat.

Lowe on R/C

(Continued from page 32)

if any. If servos are moving as though under control, then keep that transmitter off, because somebody else is operating. Adjacent frequencies, ■ close, can jitter things but operation will not be solid.

One additional note: Occasionally a manufacturer delivers ■ radio set that is erroneously marked in regard to frequency; 27.045 may really be 27.095. Check out all new equipment to be sure the frequency is accurate. In our own club, Doc Rodeghero had ■ new rig marked 27.045 and flew it as such for awhile. Then one evening I prepared to fly on 27.095 with Doc in the air. When I flipped on ■ receiver, lo and behold, the servos were zipping back and forth—wow! After Doc landed ■ checked his rig and sure enough it was on my frequency. . . .

VTO: Ernie Huber, a guy of considerable talents, has tackled the toughest model design of all—a helicopter. Over the years, some beautiful works of art have evolved, but none were practical models that really flew. However, Ernie's ship is nearing completion, after exhaustive tether testing and overcoming such problems as blade tracking and belt slippage on the tail rotor. John Ross reports that the machine has lifted 16 lb. on ■ balanced test stand using a ST60. A machinist by trade, Ernie spent six months engineering the design before starting work. This machine is said to be computer-designed,

whatever that means, but the results are only as good as the accuracy of the input data. Let's hope that Ernie put in the right data and used the right equations! . . .

RC First Aid: OK, we got shot down, had a glitch, or made an inverted pass and pulled up instead of down and there it lies in a heap—all that work down the drain! Naturally, the first suspect is for those expensive innards called the control system. What can be done to determine its status, be it dead, alive or somewhere in between? Jim McNerney, in the DC R/C Newsletter, makes some suggestions.

Don't: (1) Frantically wiggle the sticks to see if it's been killed. (2) Dust it off, fire it up, and go again. (3) Pick up the system by one component, leaving the rest to dangle. (4) Plug a suspect component into a buddy's system.

Do: (1) Turn it off (if you can find the switch). (2) Unplug the battery and check for shorts (heat). (3) Check servos and receiver plugs for bent pins, cuts or breaks in wires, etc. (4) Check servos for damaged gears, cases, etc.

If the system seems OK, hook it up and operate, but don't fly it. Take the system home where it can be opened up and every component, such as antenna and wires, servo electronics, checked for integrity. Wiggle components, check for broken ones. If it doesn't work at all and no physical damage is evident, the receiver crystal may be broken. Check by wrapping the receiver antenna around transmitter antenna. It should work if a crystal is the problem. If a servo runs to one end, the problem could be a bad output transistor.

If you don't understand the beast, don't tinker with it! Wrap it up and send the complete rig back to the manufacturer. Include a description of what preceded the crash, if equipment failure is suspected.

SUDDEN SERVICE PLANS

Full-Size Plans — Shipped First Class Mail Within 48 Hours — No Extra Charge

No. 0101, Undone I — R/C Pattern plane for 60 engine for new maneuvers and lightweight equipment. Wing span 59". $3.50

No. 0102, Skyvan — Semi-scale twin 049-powered STOL transport. Simple construction, all-balsa. For C/L. $1.60

No. 1191, Scimitar — Unusual-looking R/C stunter. High-speed maneuvers, clean tracking. 60 engines. Low-tail Rivets look. By Joe Foster. $3

No. 1192, Ryan Mailplane — Light, F/F, with plenty of details. For rubber indoor or outdoor. Plan has scale views. $1.50

No. 1193, Mig 21d — 40-powered C/L version of Russian fighter is fast, stable flyer. By Roland Baltes. $2.50

No. 1194, 1937 Gas [illegible] — Half-size 040 copy of great old-timer. Has durability and easy-to-fly characteristics. Frank Ehling. $2

No. 1091, Halberstadt — Nearly scale R/C WW I fighter with semi-symmetrical 6' wings. 60-powered. Two sheets. $4

No. 0791, Pusher Galore — Bill Hannan's all-sheet, rubber pusher for Tenderfoot. Looks like supersonic transport. $.75

No. 0894, Voltswagen — Trainer and stunter by Marsh for electric tether flying with slot-car motors. Plans for the pylon included. Great club activity. $1.80

No. 0794, Skimmer Airboat — Sled-type fun watercraft by Paul Hook. .09 engine, R/C rudder, throttle. $2

No. 0991, Flashby I — Rakish-looking all-balsa ROG by Wayne Brown. For the Tenderfoot. Tricycle gear. $1

No. 0992, Fouga Cyclone — Scale model of jet-assisted French sailplane, by Nick Ziroli. Gains altitude easily on 09 engine. A two-piece 7-ft. wing. For R/C. $3.50

No. 0993, La Jollita — Profile 15-powered Goodyear C/L racer by James Kloth, fast, groovy. On mild fuel and engine does 85 mph. $1.25

No. 0892, Taylor [illegible] F-2 — Sport, F/F, scale, .020 Stick-and-tissue. By Schreyer. $1.75

No. 0893, Martin MO-1 — Rare WW-1 era monoplane, carrier fighter ideal for Class I Carrier. Ailerons keep lines tight at [illegible] speed. By Reeves. $1.50

No. 1181, Junkers D-1 — Joe Tschirgi [illegible] fighter, proportions for perfect R/C scale. .45 engine. Low-wing has 500 sq. in. $2.50

No. 1182, FAI Pussy Cat — On this FF, [illegible] Thompson [illegible] high thrust-line, rear fin, [illegible] lines to hurdle climb/transition gap. Hot .15. $3.50

No. 1281, Strato-Streak '68 — Frank Heeb's ½A F/F updated version of hottest gas model of 1941 era. Simple pylon, 275 sq. in. $1.50

No. [illegible], Sky Mite — Small R/C multi by Hibbard has performance [illegible] larger craft. Foam and fiberglass. Span 52". Weight with 4-channel gear, 4 lb., [illegible] to 35 engines. $2.25

No. 0191, Curtiss-Wright Jr. — Robert Hawkins transformed open-cockpit pusher of thirties for single channel. First step into RC scale. Span 44". Use 049. $2.50

No. 0192, Skyraider — Moulin's Navy Carrier, fast, light, 40's or 60's. Easy construction. $2.50

No. 0193, Cutie Coupe — Coupe d'Hiver F/F by Dave Linstrum. Quick to build with all-sheet surfaces. Your first rubber contest model. $1.75

No. 0291, R/C [illegible] — Ed Sweeney's conversion of famous C/L stunt ship. A highly maneuverable R/C. Only .40 for all AMA/FAI stunts. $2.50

No. 0491, Emeraude — Duke [illegible] reduced famous home-built to R/C size [illegible]. 40 to 60, does stunt pattern. Gentle. Two sheets. $3.75

No. 0492, Bleep — Don Yearout's show Control-Line bipe spectacular performer. 60-powered, flies slow, maneuverable. Two sheets. $4

No. 0591, Small Fry Special — [illegible]tin's C/L trainer for Tenderfoot. Easy to build. An [illegible]. $.75

No. 0592, Messerschmitt Bf. 109E — R/C, semi-scale by Munninghoff. Mean look of efficient fighter. Two sheets. $3.75

No. 0593, Mania — Howard Kuhn's Boost Glider for model rockets easy to build from sheet. A winner. $.75

No. 0691, Jr. Sky Squire — R/C sport-trainer by Jess Krieser. .09 to .19 [illegible] Galloping Ghost to multi-digital proportional. Span 48" (416 sq. in.). 3 lbs. $2.50

No. 0692, ½A Sky Squire — Small version famous Sky Squire 1 ch. rudder-only, or rudder, elevator and motor [illegible] Galloping Ghost. Only 22-24 oz. $2

No. [illegible] Mustang — [illegible]'s great near-scale C/L stunt. Flies pattern with ease. ST 40. Over 5?" $2

No. 0792, Rivets — Speedy, responsive R/C. Owen Kampen design for .020 Adams Baby Actuator, rudder-only. $1.75

No. 1183, Corrigan — James Wilson's unique ½A C/L stunt model. Flies tail first! Stable like big [illegible] ships. Easy to build, 23". $1.75

No. A593, Sweeper — Windy Urtnowski's giant, C/L stunter, 78" span. [illegible] up front. Many trim adjustment features. $2.75

No. A695, Lady Maxley — Brian Dunn's A/2 Nordic towline. Davis 3 foil. Ritz construction. $1.50

No. A697, Dwarf Dip III — Easy to fly, rubber Coupe de Hiver by Charles Sotich, a winner! For small fields. Warp-resistant. $1.50

No. [illegible]1, E A A Biplane — Nick Ziroli's scale R/C uses 40 engine, full house gear. 38" wings, semi-symmetrical foil, box-and-stringer fuselage. Two sheets. $2.50

No. A692, Miracle Worker — John Blum's C/L trainer. Combat, carrier, stunt. Easy-to-build profile [illegible] engine. $1.50

No. A694, Montana Duster — R/C Class-C stunter by Simon Deese, semi-scale appearance. Foam wings, simplified assembly in 6 hrs. Two sheets. $3.50

No. 1291, Demon Delta — Fast, mild-stunting C/L for 35-45 [illegible] like modern fighter. Attract attention for demonstrations. By Jerry Farr. $2.50

No. 1292, Dolphin II — Czechoslovakian R/C for pusher, 09-15 mounted at rear under T-tail. Rudder-only, good slope soarer. $1.75

No. 1293, A/Wonder — Simple all-[illegible] A-1 towliner by Bob Stalick. Ideal for beginners at towline events. $1.50

No. 0201, Cardboard Cutie — Inexpensive all cardboard C/L for Tenderfoot. 049. Two sheets. $1.25

No. 0202, Push-Air — For Brown's tiny CO2 engine. Simple F/F by Ehling, like Curtiss-Wright Jr. $.75

No. 0203, [illegible] Tiger — Bob Morse's swift Formula I R/C of Bob Downey's famous racer. K&B 40. $3.50

No. 0204, Classical Gas — Haught's C/L stunt for 35, for flyers graduating from profiles. $2

No. 0205, Kestrel — Dave Boddington's delightful R/C rudder-only soarer with [illegible]. $1.50

No. 0301, 1916 B&W — Biplane on floats was Boeing's first airplane. Beautiful R/C job by Francis Reynolds, uses a 60. Two sheets. $4.60

No. 0302, Bearcat — Al Rabe's stunt C/L was talk of the 1966 Nats. Aldrich customized ST 46. $2.00

No. 0303, Mistral — R/C by J. Swift, is fully aerobatic 50" job with 40 engine. $3.00

No. 0304, M. K. Sportster — Ho Fang-Chiun's cute cabin free-flight takes 049 power. $1.25

No. 0401, D-H 88 Comet — Scale twin by Skip Williams from Jan. '61 counterpoint for 20's. Fast, stable, can fly pylon rules. $3.75

No. 0402, Lively Lady — World Championships winning Nordic by Elton Drew. Well detailed plan. All weather flyer. $1.75

No. 0403, Booster — C/L Goodyear for club project with 35 engines. All balsa and plan has balsa cutting guides. By Williamson. $2.50

No. 0404, Swappee — C/L Goodyear by Williamson for club project also is tough trainer. For 35 engine. Balsa cutting guide incl. $2.50

No. 0501, Classic — Contest F/F for ½A to C engines. Build any size, photo reduce plan to suit. As supplied, plan is for C class. Good detail. $4.50

No. 0502, [illegible] Pod — All-purpose model, F/F, R/C, or tether glider or power. Fiberglass pod, arrow-shaft boom. $1.75

No. 0503, Royal Marine — By Yuji Oki of Japan, magnificent seaplane with 6' wing. Two 40's or one 60. Graceful lines, smooth flyer, handles easily on water. Two huge plan sheets, every part shown in detail. $5.00

No. 0504, Dragonfly — Advanced C/L trainer with interesting shape for a 19. Flat-bottom airfoil easy to build, flies slowly. $2.50

No. 0601, Flower Power — Sport/stunt full-house RC with a 40 engine. All-balsa, simplified structure. Plugs generation gap. $2.50

No. 0602, Skyraider — Profile or built-up fuselage shape Navy Carrier job for 35-60 engine. A winner or a trainer all-in-one. $2.00

No. 0603, Waco — Delightful bi-plane, stick and tissue, rudder-only RC on [illegible] to 020 for FF. Very well detailed plan. $2.50

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Washington, D.C. 20005

Please send the following plans by First Class mail, at no extra charge. I enclose $________ for payment.

Name ______________________________

Address ____________________________

City ________________ State ________ Zip ________

PLAN NO.	COST
# ________	$ ________
# ________	$ ________
# ________	$ ________
# ________	$ ________
# ________	$ ________
# ________	$ ________
	Total: $

No. 0701, Suds — Nimble RC for sport or competition. One-piece construction, 40 to 60 engines. Build from standard balsa sizes. By Joe Dolan. $4.25

No. 0702, Contender — Military-like RC, also Sport/Stunt type for 35-60. Tri-gear, removable no-dihedral wing. Fast building. By Dave Platt. $4.25
Special Offer: Get both and Contender plans for only $7.00

No. 0703, Ironsides — Record-holding CL jet speed model. Metal or model shown. Uses Dyna-Jet. By Jerry Thomas. Two plan sheets. $1.25

No. 0704, Cessna AW — Delightful stick and tissue FF of great private plane of years ago. Indoor or outdoor version possible. Peanut Scale too. $1.50

No. 0801, Winnie Mae — Spectacular RC Vega for strong .60 engine in 2"-1' scale, foam and balsa, lots of details. By Monty Groves. Two big sheets. $4.50

Also, special 1½"-1' version for FAI scale, 40 thru 60's. Two sheets. Order as No. 0802. $4.25

No. 0803, Thermal Dart — Enlarged and improved rubber-powered beginner's delight by Frank Ehling. $1.00

No. 0804, SV-14t B — Asymmetrical WW II fighter bomber in profile for .049 engine by Terry Aldrich. Easy to make, good flyer. $2.00

No. 0901, Sorcerer — Pee Wee .02-powered, free-flight flying saucer uses sheet wing, easy to make by Tenderfoot builder. $1.00

No. 0902, Cloud 9 — Intricate contest winning Wakefield by Roger Gregory. Plan shows streamlined prop/hub design. $3.50

No. 0903, Hawker Typhoon — Dennis Adamidis's scale-like CL stunter which won Junior Nats stunt event. Conventional type. $4.00

No. 0904, Antoinette — Signorino/Zundel RC, 98" wing, nearly scale, flies well on .36, like powered glider. Plans & huge detailed sheets. $6.00

No. 0905, Mini Cat — Bud Aldinger scaled down the Cat series, for pulse or light digital and up to engines. Easy to make RC sport flyer. $2.75

No. 1001, Phantom — Well-engineered RC Dyna-Jet-powered scale fighter by Ralph Saldivar. Is practical but noisy model. Highly detailed plane Jet installation shown. $4.00

No. 1002, Habbit — Simplified Nordic AI by Bob Stalick. Stands on tow, all-weather flyer. $1.50

No. 1003, Charger — ½A powered sweptwing stunter does full pattern on long lines safely. $2.00

THIS MONTH'S PLANS

No. 1101, Autogiro—Simple .049-powered model builds fast and gives unique performance. Pusher prop or motor. $1.25

No. 1102, Aerobile—Large scale CL or RC of a famous Waterman roadable plane. Uses 45-60 motor. Wing detachable, car drivable! Large single-sheet plans. $4.00

No. 1103, Akromaster—RC scale/stunt model of real aerobatic plane for 45-60 engine. Fast and responsive, easy to make, simple shapes. $2.75

No. 1104, Tardon—Formula II semi-scale prion racer or stunt plane for 40 engines. Won event of 1969 NATS. Groovy flier. $3.00

Spinks Akromaster

(Continued from page 26)

fuselage wing saddle (see drawing). Then drill the ¼" dowel holes the rear fuselage ply saddle before it is glued on. The front saddle can wait until the wing and its saddle finished. Then drill the two holes through them both. For added strength, small pieces of ¾" maple triangle stock are put behind the firewall and onto the sides.

Next, lay out and drill holes for the Nyrods. The ⅛" sheet top then can be installed. Cut the top F4 and cement the rear portion. Glue in large blocks. Then plane and sand sides of the fuselage for the 45-degree angle top sheets. The top must rounded the contour shown on drawing. This template cut in half, which makes it easier to Install Nyrods and sheet the bottom with ⅛" balsa.

The 1" block is held on with two wood screws. Two 5/16" holes are drilled right through the block into fuselage. The holes filled with pieces of 5/16" dowel glued into the block and fuselage. Then drill through them for the wood The result is more permanent hardwood mounting.

The nose shaped to the outline shown in the Spinks article and the plans. It's rather simple one. Cut the back of the nose block to fit engine carburetor and throttle linkage. With the engine mounted, check the clearance for and spinner.

Behind the forward ⅛" ply wing saddle on the fuselage, epoxy piece of hardwood triangle stock. This will ac-

cept the 10-32 tapped holes to hold the forward part of the wing to the fuselage.

The stabilizer and elevator are ½" sheet, and the fin and rudder are ⅜" sheet balsa. Hinge as desired. The stab, fitted between two balsa filler blocks, must be set at zero degrees incidence.

A fellow flier helped [illegible] cut the foam wing. A piece of trailing edge balsa stock is glued to the trailing edge of the core. The leading edge is [illegible] piece of ½" sheet rounded off to match the airfoil. The core is then sheeted with 1/16" balsa. Lay out and cut the ailerons. The sheet on front of the aileron is replaced after the angle is cut.

Then mark out the round aileron bellcrank wells, which [illegible] be cut out with 1/32" music wire in [illegible] soldering gun. Remove [illegible] oversize disk of balsa, insert the hot wire and rotate. The wire cuts [illegible] perfect wafer of foam. Then a bellcrank [illegible] mounted on a 3/32" ply disk and epoxied in place. Now take a ⅛" piece of music wire, heat the end with [illegible] propane torch, and plunge it down through the wing. This makes the pushrod slot. Assemble bellcrank and wire. Do this to both halves and then epoxy together, using glass cloth around the joints.

Both front and back sides of the saddle [illegible] ⅛" ply. Glue the landing gear blocks together. Hollow out the wing to [illegible] the double-decker gear mount and attach it with plenty of epoxy. Cover this assembled saddle with 1/16" ply. Note that the landing gears are mounted across the saddle, one in front of the other. When covering the 3/16" wire gear, make the groove for one forward of center and the other to the rear. When viewed from the side no one will know one landing gear is ahead of the other, and the ground handling is not affected at all.

Two ¼" dia. dowels hold on the rear wing, and two 10-32 nylon bolts retain the front. I lay the wing [illegible] a flat piece of 4' sq. Novoply, which is flat and true and makes [illegible] excellent work surface. Glue [illegible] stab and rudder. I buried a Royal Products tail-wheel bracket in the rear of the fuselage, although any combination of 3/32" wire and tubing should work. The rudder has a hole drilled in it to accept the movable arm of the tail wheel.

Radio installation is up to the builder. I used a Kraft with KP-10 servos. Try to keep the weight down.

The entire plane was covered with Super MonoKote, which keeps the weight within reason. For an exact copy of the real plane, follow closely the color scheme given in the AAM article, June '69 **Air Progress** has a color photo of the Spinks and it's a beauty.

The canopy [illegible] vacuum-formed and cemented in place with Walthers Goo. The wheel pants were molded in fiberglass after R.T.V. molds were produced from wooden patterns. A Royal Products needle-nose spinner was used on the front end. Plywood fairings, added to the landing gear, have slots which are staggered to give the appearance of both axles being [illegible] a common centerline.

[illegible] would be nice to say that Spinks flew the first time out, but it didn't! A loose transmitter antenna caused some range problems. Once the antenna was securely tightened, the plane flew like [illegible] dream. It tracks straight and true on level ground and then rises off smoothly at about half-throttle. Push the throttle full forward and the Spinks moves up like a scorched cat. It does fly fast but

is extremely groovy.

As might be expected, the plane flies inverted with a minimum of down elevator, and the rolls are smooth. The knife edge also is excellent. It would seem that the big, wide fuselage might detract from both knife edge or straight and level, but it doesn't seem to affect them and even may help. The small stab and elevator are more than adequate. I used a long Rocket City horn on the elevator. The plane enters a spin realistically but must be completely stalled out. Try a Lomcovak and watch it flip like a spinning pinwheel.

The Spinks lands like it flies—fast. Go way out and start chopping the throttle on the downwind leg. Then turn and kill it all the way. As the plane settles, keep hauling back on the elevator. Touchdown will occur when the glide can't be stretched any more. Any wind will help slow it considerably. Flaps might help, but none are shown in the AAM drawing or mentioned in the article. A 60 engine is more than adequate, and a 40 or 45 would handle it well. For scale enthusiasts the Spinks Akromaster is an easy one to build.

Should anyone want a canopy, wheel pants or a foam wing I will make them available if the demand warrants it.

Autogiro

(Continued from page 17)

and bend three rotor arms from 1/16" dia. wire. The rotor hub is made from 1/32" sheet brass or galvanized iron, with a 3/32" dia. hole drilled in its center. A rotor hub bushing is cut from brass tubing (1/16" ID and 3/32" OD). Jig up this assembly in an inverted position, by inserting the brass tubing into the hub and spacing the rotor 120 degrees apart. Recheck the assembly's alignment and then solder into one unit. After soldering, turn the completed unit over into the proper position and twist each arm end up five degrees.

Rotor Blades: Cut three rotor blades from 3/32" sheet balsa and sand all their edges round. Then cement a 1/16 x ⅛" balsa frame to the bottom of each rotor blade. Insert a rotor arm (from the soldered assembly) into the frame of each rotor blade. Glue this area thoroughly. When this unit has dried, bend each arm to form a 2¼" dihedral at the tip of each rotor blade.

Landing Gear: Cut 1/16" dia. wire to length and bend to shape. Next, notch the previously installed landing gear platforms 1/16" deep and insert wire flush with the platform's surface. Fasten the landing gear to the fuselage with 1/32" aluminum landing gear retainers, which are wood-screwed to the plywood platform. With soft wire, bind each side of the main landing gear V and solder. Also solder the inside wheel-retaining washers and install wheels, then solder the outside wheel-retaining washers.

Final Assembly: This autogiro was designed for 049 engine power. Select one of the medium-power engines and mount it to the ⅛" plywood firewall with wood screws. Keep the thrust line as near to zero degrees as possible. A 4" nylon pusher prop is used but each blade tip is trimmed ¾" to make the diameter 4½".

To install the fuel tank, hollow out the balsa just below the firewall. The size of tank needed depends on the flying field's area. Although the autogiro can climb to tremendous heights, it descends nearby in still air.

Begin installation of the completed rotor assembly by placing a plain washer over the 1/16" dia. rotor shaft, then add the rotor assembly. On top of that, sandwich a ball-bearing between two plain washers. Bind the tip of the shaft with fine wire and solder. The rotor blades should spin freely and be reasonably well-balanced. Balance the blades by inserting and gluing small bits of lead to the lighter blade tips.

Insert ⅛" hardwood dowels to the rear of the fuselage, and rubber-band the tail unit in place. Check alignment. The center of gravity position is shown on the plans and can be corrected by adding lead weight to the nose or tail.

My model was finished with one coat of black fuelproof dope and striped with yellow markings. Dummy cabin windows were striped with tape and doped a pale green.

Testing and Flying: After rechecking the alignment of flying surfaces and the center of gravity location, one important adjustment remains before test flying. Tilt the entire rotor assembly to the left (as viewed from the rear of model) by bending the rotor shaft, just below the rotor bushing, approximately 1/32" to 1/16" from the vertical. This slight bend in the rotor shaft is an effective control in flight. When the rotor shaft is bent to left, the results are similar to rudder control. Bending the shaft back has the reverse effect of incidence to a fixed-wing model.

Select a grassy area for testing. Lean out the needle valve to full power. To start the rotor blades rotating in the proper direction (counter-clockwise), turn them with a finger. An autogiro is never launched by throwing. Instead, with model facing the wind, walk until the rotor blades develop enough lift to fly the model out of the hand. Observe the first flight carefully.

If the model turns sharply to the left after launching, add opposite rudder tab. If this does not remedy the problem, rebend the rotor shaft slightly from left to right or to a more vertical position. With ideal adjustments the model should fly in left-hand circles about 300 ft. in diameter, climbing slowly to 400 to 500 ft.

After the engine stops, the autogiro should descend slowly, with near zero forward speed. If a series of gentle stalls occurs upon descent, move the center of gravity forward by adding weight to the model's nose. Flight adjustments are not difficult to achieve. Keep in mind the following: (1) Power-bend the rotor shaft for proper climb and turns, using rudder tab for fine adjustments; (2) Descent-shift center of gravity position until the model descends nearly vertically.

Tips for Performance

(Continued from page 15)

faces is provided. The best rule here is: only one adjustment at a time. Then if an error has been made, it's much simpler to undo it!

After trying various types of power, begin experimenting with the props. In order to obtain smoother and more efficient performance, it is worthwhile to balance the props. As when changing rubber, switching props probably will bring about a change in the model's balance. You may wonder why smaller props are suggested, since virtually every article emphasizes the merits of large props. However, blanket recommendations of that kind must be tempered with moderation. Probably more rubber-powered scale models have self-destructed from being overpropped and/or overpowered than from any other single cause, with the possible exception of warps. Models, which may be marginally unstable, will often perform happily with a small prop, whereas a larger fan may render them completely unflyable. But try it and see.

A change of propeller also can alter

a model's entire flight pattern. Watch, in particular, its effect on turning radius, especially when the model is set up to fly in right-hand circles. Since a change in props often brings about a change in speed, be prepared for the effect of slight warps or maladjustments to be magnified.

Tardon

(Continued from page 31)

adding 1/16" plywood formers fore and aft.

Cut out the cockpit and finish the area under the canopy. After a pilot and instrument panel are installed, epoxy the canopy in place.

Finishing and Painting: The choice of finishing methods is varied. We began with a good sanding; two coats of Hobbypoxy clear; two coats of automotive primer, wet-sanded between [redacted] and the final finish of two coats of dope [redacted] acrylic lacquer. Rub and [redacted] as desired.

Equipment Installation: When the finish has dried, hinge the control surfaces, making [redacted] they all move freely. Add the landing gear and tail-wheel. Install a [redacted] 40 rear rotor with a 2¼" spinner.

Because of the long tail-moment, radio equipment [redacted] be placed as far forward [redacted] possible. Even [redacted] it may be necessary to [redacted] lead to the nose. Tardon II weighed in [redacted]. 12 oz. before balancing. After balancing, it checked out [redacted] 5 lb. 4 [redacted]. It is [redacted] important that the plane balance [redacted] the CG than weigh in [redacted] lb.

Control movement [redacted] quite important, since most RCers use [redacted] much. By following the recommended throws on the plan, no difficulties should arise. Remember that [redacted] higher speeds less throw is just as effective as a large throw [redacted] slow speeds.

Orbit Cobra

(Continued from page 39)

[redacted] shelf. Below it, [redacted] one side, is [redacted] Eveready battery (#276) whose current consumption was measured at 60 ma. Although not rechargeable, this battery should last for two to three months of hard use. (A NiCad battery with charger is available at a slight extra cost.) Voltage between the antenna and battery terminal was measured [redacted] .8V. Signal amplitude on a CRT showed .67V from base line to peak. The battery [redacted] changed merely by removing the back cover (held by two screws) and slipping in a new one.

Throttle and gearshift levers [redacted] located on a separate board on the right side in [redacted] straightforward manner.

The receiver is the same size as all the others in Orbit's 1970 line, but it does have one significant innovation. All connectors are now much smaller [redacted] that the car-borne system can be installed easily, with minimum bulk.

The switch is the old reliable sliding type supplied with regular Orbit sets. The battery [redacted] square, which made it easier to install than the flat pack. The battery capacity is 500 ma. The receiver batteries, which are NiCads, [redacted] be charged [redacted] usual with the charger module supplied in the set. The power plugs are a new triangular polarized configuration.

Servos are based on the new 1970 PS-3D Mark III configuration. While the radio will operate the 1969 PS-3 type [redacted] older radio systems will not operate these new [redacted] because of the pulse frame rate and configuration. The [redacted] delivered four lb. thrust [redacted] the linear output but, when a rotary output is used, more speed (albeit with less thrust) [redacted] available. Speed, rather than force, [redacted] essential, especially for a car's throttle. We found the servo transit time of 0.6 sec. fairly adequate. Resolution [redacted] excellent and there was no hint of cross talk [redacted] mutual interference.

During a typical car race, the transmitter may be put on the ground (blacktop) and track temperature at times may reach 125 degrees. With mixed feelings we left the transmitter

on the track for 45 min. under the boiling California sun. The [illegible] also [illegible] left standing with the body unpainted, and yet no hint of drift [illegible] glitches developed. Thinking of our Northern buddies (who may want to operate radio-controlled snowmobiles on ice), we wanted to test the radio in [illegible] cold chamber but, lacking that, a two-hour immersion in the family refrigerator had to do. Although the servos became [illegible] little sluggish, at least they did not act crazy.

Orbit also offers a thick-gear PS-5 car servo. Its gears are strip-proof and operation is very fast. We did not have these during technical testing.

The Dynamic Car

After testing and examination of the radio, the Editor installed an identical Orbit set with the PS-5 thick-gear fast-action servos in the Dynamic car. The following description of the car is based on several weeks of operation, adjustments, and racing at the RC model car Nationals.

Instructions included with the car describe and illustrate only its basic assembly. Because of the four-wheel independent suspension, torque converter transmission, and four-part frame, the car has numerous parts and requires plenty of screwdriver exercise. Wrenches for Allen head bolts in the kit are supplied. No special tools are needed, but a Dremel Moto-tool is helpful for trimming excess material beside the spring suspension cups [illegible] the stanchions. Detailed instructions for radio installation, suspension adjustment, and handling setup are not provided. These elements are so individualized as to driver, radio brand, and driving surface that instructions would [illegible] useless.

Our installation is unique. Orbit's three-servo side-by-side tray was mounted on hardwood supports and located just behind the front suspension stanchions. The steering [illegible] has rotary output and is centrally located. The servo [illegible] the right (viewed looking forward) [illegible] transmission/clutch function and the servo on the left is the throttle function. The steering control arms were lengthened. A separate link from the [illegible] disk goes [illegible] each front-wheel steering [illegible] The receiver is wrapped in foam and placed between the front suspension stanchions. The battery pack and on-off switch [illegible] positioned beside the motor.

Once the car was assembled, it was operated to break in all parts properly, especially the transmission. Then it was completely disassembled, each part cleaned, and reassembled using Lock-Tite on all screws. The suspension elements [illegible] the bottom stanchion mounts were not permanently tightened. These are to be adjusted for handling. The universal joint which screws into the transmission was tightened, then drilled for [illegible] thin cotter pin. The transmission case was assembled with gasket glue (silicone rubber works well here too) and sealed to retain as much oil [illegible] possible. The procedures of break-in, reassembly, and [illegible] of Lock-Tite have made this Dynamic car extremely reliable.

Suspension adjustments [illegible] as follows: front wheels toe-in three degrees, tires flat on the road with control arms perfectly parallel, [illegible] 1/16" thick washer is then inserted under

the rear stanchion mount. This tilts the entire front end forward to give a castering effect and to provide understeer during hard cornering. It should be adjusted for different racing surfaces—the more slippery the surface, the more tilt. If oversteer (continuous spin-outs) remains a problem, put ■ strip of plastic electrical tape around the front tire, covering with one layer of tape only the second and third treads in from the outside. This reduces tire bite.

At the rear, the suspension must be set to have the tires flat on the road at all suspension positions. This means equal length control arms. Adjust the rear suspension spring to be quite hard and stiff. The downward travel of the rear suspension must be limited by drilling and tapping a 4-40 bolt hole immediately under the lower control arms on the chassis and just beside the stanchions. A 4-40 roundhead screw in these holes is screwed in from the top, which stops the suspenson ■ that the universal joints are parallel to the road. Not only does this improve handling, but it also eliminates universal joint wear.

Many builders of the Dynamic car have complained that it ■ not strong enough to withstand the abuse of hard racing and hitting walls or sharp rocks. At the car Nationals, I learned from Dynamic that a front nerf bar could be added to protect the front suspension. All the open-wheeled cars used such protection. I also learned that a strong music-wire connection must be used between servo and steering arms or between steering arms, depending

on the setup. My car has hit all kinds of obstacles, bounced over rocks, and often hit the wall. However, after adding the nerf bar and stiff steering links, the car is just as rugged as the non-suspended type cars.

The question most asked at the Nationals was whether it is worth the trouble to have a suspension such [redacted] this one. Some cars had absolutely no suspension. Driver limitations (my errors and inexperience) kept the car from contention, but it handled better, it always passed the competition during the corners, and, with the torque converter solidly in gear, it usually outraced them on the straight. I think the suspension is worth the trouble and expense, but it must be patiently adjusted, trimmed, tested, etc., to obtain top-notch performance. If these results are not worth the time involved, use a simpler car—but don't expect the same ultimate performance, available only with the Dynamic car.

Together, the Orbit Cobra and the fully suspended Dynamic car make [redacted] winning combination.

AIR SHOW

The Confederate Air Force *Flying Museum* Air Show will be held at Rebel Field in Harlingen, Texas, on October 25th, 1970.

For additional information [redacted] the show, featuring World War II combat aircraft in action, contact: Headquarters, Rebel Field, Harlingen, Tex. 78550.

AMA Contest Calendar

(Continued from page 56)

Oct. 4—Milford, Conn. [illegible] Sponsor: **Flying Aces Club**

Oct. 4—Council Bluffs, Iowa [illegible] Sponsor: **Balsa Busters**

Oct. 4—LaSalle, Ill. [illegible] Sponsor: **Illinois Valley Radio Control Club.**

Oct. 4—Van Nuys, Calif. [illegible] FF, CL & RC Meet [illegible] Sponsor: **Flightmasters.**

Oct. 10-11—Taft, Calif. [illegible] FF Meet [illegible] Sponsor: **Califas Club**

Oct. 10-11—New Orleans, La. [illegible] Annual [illegible] RC [illegible] Wiltz CD [illegible]

Oct. 11—Ohio City, Ohio [illegible] Sponsor: **SHOO Flyers MAC Inc.**

Oct. 11—Mentor, Ohio [illegible] Euclid, Ohio [illegible]

Oct. 11—Watermill, L.I., N.Y. [illegible] Annual Radio Meet [illegible] Sponsor: **Suffolk Falcon's Club.**

Oct. 11—Sacramento, Calif. [illegible] FF Council [illegible] Sacramento, Calif. [illegible] Sponsor: **Capitol Condors**

Oct. 11—Lincoln Park, N.J. [illegible] Show [illegible] Fairfield, N.J. [illegible] Sponsor: **Garden State Circle Burners**

Oct. 11—Vineland, N.J. [illegible] CL Meet [illegible] Sponsor: [redacted] **Jersey Aeromodelers**

Oct. 11—Phoenix, Ariz. [illegible] Annual Phoenix RC Invitational Meet [illegible] Phoenix, Ariz. [illegible] Sponsor: **Air-Zona Model [redacted] Club.**

Oct. 11—Richmond, Va. [illegible] Annual Fall FF Meet [illegible] 742 Tomahawk Dr., Newport News, Va. [illegible] Sponsor:

Brainbusters Model Airplane Club.

Oct. 17-18—Oklahoma City, Okla. Oklahoma Model Hobbie Fair Demo Flying. Site: State Fair Park. R. McGee CD, 405 NW 30th, Oklahoma City, Okla. 73118. Sponsor: **T.O.R.K.S.**

Oct. 18—Garden Grove, Calif. (AAA) Golden West CL Championships. Site: Garden Grove Park. J. Plaunt CD, 196 S. Monterey St., #3, Alhambra, Calif. 91801. Sponsor: **Orange County Thunderbugs Model Airplane Club.**

Oct. 24-25—Bay St. Louis, Miss. (AA) 5th Annual Dyna-Soarers FF Folly. Site: Bayside Park. J. Pedre- [illegible] CD, 4658 Redwood St., New Orleans, La. 70127. Sponsor: **Dyna-Soarers MAC.**

Oct. 24-25—So. [illegible]te, Calif. (AA) Open Pylon RC Races. Site: Whittier Narrows. J. Garabidian CD, 909 N. 3rd St., Montebello, Calif. 90640. Sponsor: **San Gabriel Valley RC.**

Oct. 25—Fresno, Calif. (A) Fresno's Monthly FF Contest. Site: Near Kerman, Calif. E. Gallo CD, 1726 Kenmore Dr., W., Fresno, Calif. 93703. Sponsor: **Fresno Gas Model Club.**

Nov. 7-8—Taft, Calif. (AA) WFFA FAI Annual FF Contest. Site: Gardner Field. R. Vinson CD, 239 E. Wilson, Costa Mesa, Calif. 92627. Sponsor: **Sky Hoppers of Orange County.**

Nov. 15—Colorado (A) Magnificent Mountain Men Indoor Meet. Site: Hinkley High School. B. Hubaugh CD, 755 Moline St., Aurora, Colo. 80010. Sponsor: **Magnificent Mountain Men.**

Nov. 15—Sacramento, Calif. (AA) Northern Calif. FF Council Contest. Site: Condora Field (Wengel Field). D. Foote CD, 2458 Palmetto St., Oakland, Calif. 94602. Sponsor: **Oakland Cloud Busters.**

Nov. 22—Van Nuys, Calif. (Special Contest) Northrup Flying Wing Contest. Site: Model Airport (Basin). C. Hatrak CD, 3925 W. 144th St., Hawthorne, Calif. 90250.

Nov. 27-28-29—Tucson, Ariz. (AA) Winter RC Nationals. Site: Marana Air Park. R. Angus CD, 6040 N. Columbus, Tucson, Ariz. 85718. Sponsor: **Tucson RC Club.**

Nov. 29—Fresno, Calif. (A) Fresno's Monthly FF Contest. [illegible] Near Kerman, Calif. E. Gallo CD, 1726 Kenmore Dr., W., Fresno, Calif. 93703. Sponsor: **Fresno [illegible] Club.**

Dec. 13—Van Nuys, Calif. 2nd Annual Jumbo Rubber Scale FF Meet. Site: Sepulveda Basin. J. Dudley CD, 11101 Monael Ave., Inglewood, Calif. 90304. Sponsor: **Flightmasters.**

Dec. 13—Los Angeles, Calif. (AA) SCIFSS Year Ender for Old Timer Events. Site: Sepulveda Basin. R. Keller CD, 1820 Monte St., Simi, Calif. 93065. Sponsor: **Southern California Ignition Flyers.**

Dec. 27—Fresno, Calif. (A) Fresno's Monthly FF Contest. Site: Near Kerman, Calif. E. Gallo CD, 1726 Kenmore Dr., W., Fresno, Calif. 93703. Sponsor: **Fresno Gas Model Club.**

Dec. 27-28—Winter Park, Fla. (AA) Tangerine International RC Championships. Site: RCATF Field. W. Schoenhardt CD, 2080 Sharon Dr., Winter Park, Fla. 32789.

1970 Nats

(Continued from page 66)

this year but became Champ by taking fourth in Pylon I, and fifth in D Pattern.

The 1969 U.S. RC World Championship team took the top four D Pattern places, including second place for **Jim Edwards** (New Albany, Miss.) who [illegible] the reserve team member last year. **Jim Kirkland** (Valparaiso, Fla.) took first, **Phil Kraft** (Oceanside, Calif.) was third, **Jim Whitley** (Decatur, Ala.) was fourth.

The third annual Delta Dart Nats event was again [illegible] great success. More models were actually flown than ever before—over two thousand out of many more that were built. Over forty people pitched in to operate the event which ran during five days of the Nats, including [illegible] special day for children of station personnel.

This year the event featured the HIAA-Flyer version of the Delta Dart, with bulk-pack kits produced by member firms of the Hobby Industry Assn. of America. New simplified pictorial instructions were used to aid construction, and the kits were praised as a major contribution to the current AMA-HIAA Junior Program.

The event was highlighted [illegible] local TV, with a reporter building [illegible] Dart for the cameras. **Miss Model Aviation—Suzanne Bowie,** a cute and cheerful **Continental Airlines** stewardess—also built and flew a Delta Dart along with the youngsters. One hundred and fifty awards were given to Delta Dart con-

testants—30 per day; 10 for each of three age groups from 8 to 13. Delta Dart was a big effort this year, better supported and organized than ever before.

Scale got a major overhaul in practically all categories this year, with new procedures and scoring forms. As a result, Scale judging was credited with being more consistent and efficient this year, despite increased entries. Control Line had some crowd control and score confusion problems, but otherwise Scale as a whole was a happier Nats category to most entrants. To top off a great week, **the AMA Executive Council approved the upgrading of Scale to full Contest Board status,** effective immediately, with **Claude McCullough** (Ottumwa, Iowa) as its first chairman.

Nats week was climaxed by an outstanding Sunday Air Show. The Navy's **Air Barons**—also dubbed the Red Barons due to their colorful uniforms—put on a great full scale precision flying demonstration which equalled that of the better known Blue Angels Navy team. The Barons' A4D Skyhawks were smaller and more maneuverable, enabling their show to be flown in a much smaller area of airspace.

Both before and after the Barons, modelers flew all types of demonstrations: CL Combat and Racing, Speed and Stunt; RC Sailplaning, Pylon Racing, Aerobatics; FF was represented by a great Old Timer flight and a pair of flying saucers. At one time there were at least twelve models in the air simultaneously. About seventy-five modelers took part, and each received a special Nats Air Show medal and ribbon from Miss Model Aviation at the end of the program.

Nats week ended suddenly and spectacularly at the close of the Air Show. As the show ended, **Admiral Bernard M. Strean, Chief of Naval Air Training, Pensacola, Fla., indicated his pleasure at how well the Nats went and said that the 1971 Nats would be held again at Glenview.** This was further confirmed by the new commanding officer for Glenview who took over immediately after this year's Nats. The basic Navy position seems to be that economic and operational problems prevent continuing the former policy of changing the Nats location each year, at least for the present. The next best thing, according to Navy officers, is to do all that's possible to make the Nats at Glenview better than ever so as to make the trip worthwhile for those who might be able to come from far away.

Already discussions are being held to improve on various aspects of the 1970 Nats, with a particular view toward better informing of contestants and spectators as to field activity and also simplification of paperwork, procedures, and processing.

One new aspect of the 1970 Nats was well received—tenting. The tent and camping trailer areas were well used and caused no major problems. They greatly relieved the berthing shortage at Glenview and permitted many to attend the Nats cheaply as to offset the cost of traveling. The success of this operation has assured its continuance next year.

In a future issue we'll tell more about the great '70 Nats: how it was organized and who contributed to its success. It's a story worth knowing—it took well over a hundred officials and lots of effort.

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